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The Relationship between Uncompensated Care and Hospital Financial Position: Implications of the ACA Medicaid Expansion for Hospital Operating Margins

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This Special Issue of the *Journal of Health Care Finance* honors Dr. Louis C. Gapenski for his contributions to the fields of health care finance, public health finance and health administration. In his writing, teaching and mentoring, he served as a role model for all of us.

The Relationship between Uncompensated Care and Hospital Financial Position: Implications of the ACA Medicaid Expansion for Hospital Operating Margins

Abstract

Objective: Medicaid expansion under the Affordable Care Act has reduced the number of uninsured Americans and, by extension, has reduced uncompensated care. However, whether these changes improve hospital finances is a complex question, and the answer depends on the relative payment amounts that hospitals receive from Medicaid, uninsured patients, and private insurers and the extent to which Medicaid coverage crowds-out private insurance. We explore these effects and identify the conditions under which Medicaid expansion will improve hospital finances.

Data: Nationally representative inpatient, emergency department, and outpatient event files from the 2001-2012 Medical Expenditure Panel Survey.

Study Design: We estimate average hospital reimbursements by payer source (Medicaid, uninsured, privately insured) in the inpatient, emergency department, and outpatient hospital settings and use these estimates to simulate the impact of changes in payer mix on uncompensated care and hospital revenues.

Principal Findings: Overall, hospitals receive 9 times as much reimbursement from Medicaid as from uninsured patients with the same conditions in the inpatient setting and 2.5 times as much in the emergency department and outpatient settings. Hospitals receive 1.5 times more for privately insured patients than Medicaid in the inpatient setting and over 3 times as much in the emergency department and outpatient settings. We find that very high crowd-out would be required to reduce inpatient revenue (70%) and moderately high crowd-out would be required to reduce emergency department and outpatient revenue (30%).

Conclusions: The financial impact of Medicaid expansion on hospitals will vary across care settings and conditions as well as the extent to which new Medicaid patients would otherwise have been uninsured or would have had private insurance.

Introduction

Since the Affordable Care Act's main coverage provisions took effect, insurance coverage has increased dramatically. Between 2010, when the law was signed, and 2015, the number of Americans without insurance fell by roughly 20 million (Obama, 2016). These dramatic gains in coverage are largely due to the expansion of Medicaid programs to low-income, childless adults in 31 states and the District of Columbia (DeLeire, Joynt and McDonald, 2014; Kaiser Family Foundation, 2015).

The impact of the ACA's Medicaid expansion on hospitals was both swift and sharp; hospitals in states that expanded Medicaid experienced an immediate reduction in the share of uninsured patients and a similarly sized increase in the share of patients with public coverage (Nikpay, Buchmueller and Levy, 2016a; Hempstead and Cantor, 2016; Pines et al., 2016). As the number of uninsured Americans has fallen, so too has uncompensated care—the cost to hospitals of providing care for which no payment was received from either the patient or a third-party payer. Recent estimates suggest that, by the end of 2014, uncompensated care has fallen by about a third in states that have implemented the Medicaid expansion (Dranove, Garthwaite and Ody, 2016; Cunningham et al., 2016). Because of the anticipated financial benefits of coverage expansion, hospitals have been strong proponents of expanding Medicaid (Ollove, 2013). As one hospital administrator put it, "[g]etting paid something is better than getting paid nothing" (Nixon, 2014).

The net impact on Medicaid expansion on hospital finances will depend on which type of coverage those new Medicaid enrollees would have had if the program had not expanded and how Medicaid payment rates compare to amounts paid by private insurers and self-pay patients. Because private insurance tends to pay substantially more than Medicaid, "crowd-out"—the substitution of Medicaid for private insurance coverage—will have a negative effect on hospital revenues. Previous expansions of the Medicaid program have resulted in crowd-out, with rates ranging from 15 to 50 percent, depending on the type of expansion (Buchmueller, Ham and Shore-Sheppard, 2016; Congressional Budget, 2007; Gruber and Simon, 2008). Because hospitals are generally not able to collect full payment from uninsured patients, they will be better off when uninsured patients gain Medicaid. However, in certain circumstances these gains will be limited. While some uninsured patients qualify for a full write-off of hospital charges through a hospital charity care policy, many qualify for only a partial write-off or nothing at all. Those who receive a bill may be charged the full, or "list," price for care, which can exceed the true cost of care by an order of magnitude (Bai and Anderson, 2015).

Previous research from select states and care settings has demonstrated that when uninsured patients pay out-of-pocket, self-pay amounts often are similar to, or sometimes exceed, Medicaid or even private reimbursement. For example, Melnick and Fonkych (2008) find that, on average, California hospitals collected 20 percent more from uninsured patients than from Medicaid patients between 2001 and 2005. Furthermore, in 2005, nearly one quarter of uninsured patients received care from a hospital that collected more from uninsured patients than privately insured patients. A similar pattern has been observed in office-based physician care: using a dataset of physician office claims, Gruber and Rodriguez (2007) find that 40 percent of uninsured patients paid more than the insured for a given service. The combined effect of Medicaid crowding out private insurance and a small difference between what hospitals receive from Medicaid and

uninsured patients may explain anecdotal reports of worsened hospital operating performance for some hospitals after the main coverage provisions of the ACA went into effect (Weaver, 2015; Innes, 2015; Nixon, 2014).[1]

In this paper we consider how payment rates compare across payer sources and describe the implications that these differences have for hospital finances when payer mix changes. We calculate average reimbursements by payer for the top 10 most common hospital diagnoses among non-disabled, adult Medicaid beneficiaries and calculate the ratio of the average reimbursement hospitals receive from uninsured or privately insured patients relative to what they receive from uninsured patients. We use these average reimbursement levels to estimate the crowd-out level above which the substitution of private pay patients for Medicaid patients could result in reduced profits. We call this quantity the "break-even crowd-out rate." We then estimate average payment ratios and break-even crowd-out rates across all conditions for each hospital setting and simulate changes in uncompensated care and hospital revenue given varying levels of Medicaid take-up and crowd-out.

Data and Study Design

We used medical event data from the 2001-2012 Medical Expenditure Panel Survey (MEPS) to create a dataset of hospital reimbursements by primary ICD-9 code and source of payment (private insurance, Medicaid, and self-pay for the uninsured) for hospital inpatient, emergency room, and outpatient care. The MEPS is a nationally representative household survey that asks individuals about their health and medical care utilization. The event data describe survey respondents' self-reported medical care utilization in detail, which is then verified and supplemented through a survey of the respondents' medical providers to obtain accurate information on the primary diagnosis, charges, out-of-pocket payments, and payments from insurers (Agency for Healthcare Research and Quality, 2004). We excluded events from all dual Medicaid-Medicare eligible survey respondents, events reimbursed by a flat fee, and ICD-9 codes with fewer than 20 events. The final dataset contains 11,305 inpatient events, 35,067 emergency room events, and 69,674 outpatient events. We use the Consumer Price Index to adjust all dollar amounts to 2014 dollars. Additional details on construction of the dataset are in the appendix.

We begin the analysis by focusing on the 10 most common diagnoses among the adult, non-disabled Medicaid population for the inpatient, emergency department, and outpatient settings. The conditions are listed in rank order by frequency for each setting in Table One. The diagnoses chosen make up between 16 and 20 percent of all hospital events and between 13 and 21 percent of all payments in the MEPS. They also track closely with the top 10 conditions in the inpatient and emergency department settings according to Healthcare Cost and Utilization Project data (Owens and Mutter, 2010, Pfuntner, Wier and Stocks, 2013).

To compare reimbursements between payers, we calculated uninsured to Medicaid reimbursement ratios and privately insured to Medicaid reimbursement ratios for each diagnosis. For each ratio

[1] An exception to this observation is a report by Kaiser Family Foundation (2015), which finds greater improvements in operating margins among Acension hospitals in states that expanded Medicaid versus those that did not.

we used a nonparametric bootstrapping method with 1,000 replications to construct 95 percent confidence intervals (Polsky et al., 1997).

We also considered the impact of Medicaid expansion on hospital financial position by modeling how crowd-out might affect hospital operating revenues. Although operations include a variety of hospital functions besides patient care, such as parking and cafeteria services, the overwhelming majority of hospitals' operating revenues and expenses are derived from patient care (McKay and Gapenski, 2009, Singh and Song, 2013). The way that operating revenues (R) depend on payer mix and reimbursement rates can be illustrated with reference to simple accounting identities. If there are three types of patients—those with Medicaid (M), those with private insurance (P), and those who are uninsured (U)—then a hospital's revenue can be expressed as:

$$(1)\ R = P_M Q_M + P_P Q_P + P_U Q_U,$$

where P_i and Q_i represent the reimbursement rate and number of patients for each payment category. Assuming that payment rates are constant over time, the change in revenue between two periods is simply

$$(2)\ \Delta R = P_M \Delta Q_M + P_P \Delta Q_P + P_U \Delta Q_U$$

To simplify the calculations, assume that the total number of patients treated at the hospital is also constant over time. This would be the case if the hospital was at full capacity at baseline or if the elasticity of demand for hospital care with respect to insurance coverage is zero. This assumption implies that

$$(3)\ \Delta Q_U = - \Delta Q_M - \Delta Q_P.$$

Substituting (3) into (2) gives us:

$$(4)\ \Delta R = (P_M - P_U)\Delta Q_M + (P_P - P_U)\Delta Q_P$$

All else equal, an additional Medicaid patient will increase revenues by $(P_M - P_U)$, the difference between the Medicaid payment rate and the amount that hospitals were getting from uninsured patients. If the Medicaid expansion does not lead to a decline in private insurance—that is, if $\Delta Q_P = 0$—then hospital revenue will increase. However, if the Medicaid expansion leads to a decline in private insurance then revenue will fall, all else equal. To better understand these opposing effects, it is useful to rearrange equation (4) as follows:

$$(5)\ \Delta R > 0\ if\ \frac{P_M - P_U}{P_P - P_U} > -\frac{\Delta Q_P}{\Delta Q_M}$$

The left-hand side of this inequality describes the value of Medicaid reimbursement rates relative to private payers. In general, this ratio will be less than one. The right-hand side expresses the change in the number of private patients relative to the change in the number of Medicaid patients. This ratio is similar to a standard measure of "crowd-out" used in the literature on the effects of eligibility expansions on insurance coverage. In that context it represents the share of

new Medicaid enrollees who would have otherwise had private insurance. Intuitively, this inequality implies that the expansion of Medicaid can cause hospital revenues to decline if the expansion causes a significant decline in private insurance, especially if Medicaid reimbursements are low relative to what private insurers pay.

Given this relationship among revenues, reimbursement rates, and changes in payer mix, we can use observed differences in payment rates to calculate a "break-even crowd-out rate." This measure answers the hypothetical question: for a given set of Medicaid and private insurer payment rates, how high can the rate of crowd-out be before increases in Medicaid result in a decline in revenue? To understand this measure, consider some simple examples. First, suppose that Medicaid and private payment rates were the same. In that case, crowd-out would be inconsequential because a patient that transitioned from private coverage to Medicaid would be providing the same revenue before and after. This would not be the case, however, if Medicaid payments were extremely low relative to private insurance. For example, suppose that ($P_P - P_U$) was four times greater than ($P_M - P_U$). In that case, Medicaid expansion would only lead to an increase in hospital revenue if less than one-quarter of new Medicaid patients previously had private insurance; revenue would fall if crowd-out were greater than one quarter.

Although the condition-by-condition analysis is informative for understanding how relative payment rates vary across different settings and diagnoses, what ultimately matters is the overall effect of changes in payer mix on total hospital revenues. To provide a sense of this we use data on all utilization events to estimate the relationship between type of insurance coverage and payments received by the hospital. Specifically, we estimated an ordinary least squares regression with payments as the dependent variable and dummies for uninsured and privately insured as independent variables. The omitted insurance category was Medicaid. To adjust for differences in demographics, geography, and changes in payments over our 10-year window, we also add controls for age, age squared, race and Hispanic ethnicity, education, census region and metropolitan statistical area status of residence, and year dummies. In selected specifications we include dummies for the primary 3-digit ICD-9 code associated with the event. We then use the results from these regressions to simulate changes in uncompensated care and operating revenues under various levels of Medicaid participation (25%, 50%, 75% and 100%) and crowd-out (5%, 10%, 20% and 50%).

Results

Table 1 presents unadjusted average hospital reimbursements for hospital care by coverage and setting. The top 10 inpatient conditions in our sample account for 16 percent of events in the MEPS inpatient event files. On average, Medicaid reimbursements are less than half of private insurer reimbursements, and reimbursements from the uninsured are less than half of Medicaid. This pattern is similar for the top 10 emergency department diagnoses, which explain 20 percent of the emergency department events in the MEPS. The uninsured pay more than Medicaid for two of the top-10 outpatient conditions among Medicaid patients accounting for 3.2 percent of outpatient revenues, and private reimbursements are lower than Medicaid reimbursements for several conditions in the inpatient setting accounting for 4.6 percent of inpatient revenues.

Table 1. Average Payments for the Top 10 Diagnoses by Hospital Setting and Payer Type

Inpatient							
	Share of Total	Medicaid		Private		Uninsured	
Condition	Revenues	Mean ($2014)	N	Mean ($2014)	N	Mean ($2014)	N
Depressive Disorder	3.6%	10811	71	22067	189	3693	43
Respiratory and Chest Symptoms	2.0%	12291	81	8174	207	3093	38
Diabetes Mellitus	1.9%	10738	104	13030	112	1312	73
Pneumonia	1.8%	10832	99	9422	151	169	45
Acute Cerebrovascular Disease	1.7%	13293	57	13948	102	766	25
Essential Hypertension	1.4%	9141	87	8490	134	653	59
General Symptoms	1.4%	6182	81	8126	194	847	40
Asthma	0.8%	10501	74	6826	74	121	22
Acute Myocardial Infarction	0.7%	6862	69	5813	83	1660	43
Anxiety and Somatoform Disorders	0.4%	4008	55	6148	49	471	23
Emergency Department							
	Share of Total	Medicaid		Private		Uninsured	
Condition	Revenues	Mean ($2014)	N	Mean ($2014)	N	Mean ($2014)	N
Respiratory Symptoms	5.0%	756	191	1704	510	209	346
Unspecified Injury	2.9%	517	193	953	531	282	340
General Symptoms	2.9%	519	237	1458	362	155	266
Essential Hypertension	2.4%	430	161	1570	290	202	270
Migraine	1.9%	425	169	905	385	227	170
Unspecified Back Disorders	1.9%	390	173	866	283	194	238
Asthma	1.8%	599	255	875	232	125	242
Anxiety and Somatoform Disorders	1.5%	505	146	990	191	233	195
Stomach Disorders	1.4%	526	156	1214	162	254	166
Diabetes Mellitus	1.2%	473	128	1161	139	109	250

Table 1. Continued

Outpatient							
	Share of Total	Medicaid		Private		Uninsured	
Condition	Revenues	Mean ($2014)	N	Mean ($2014)	N	Mean ($2014)	N
Breast Cancer	3.7%	458	651	1133	1278	104	117
Unspecified Joint Disorders	2.1%	323	227	980	939	441	110
Unspecified Back Disorders	2.0%	299	345	733	1075	203	143
Diabetes Mellitus	1.2%	230	445	408	918	85	271
Essential Hypertension	1.2%	255	386	613	595	238	203
Other and Unspecified Arthopathies	1.1%	233	210	760	532	365	140
Renal Failure	0.6%	386	350	696	247	28	59
Depressive Disorder	0.6%	316	561	345	318	21	116
Anxiety and Somatoform Disorders	0.3%	200	208	398	221	184	51
Episodic Mood Disorders	0.3%	196	252	289	169	3	49

NOTE: 2001-2012 Medical Expenditure Panel Survey. The figure presents average reimbursements for the uninsured and privately insured for the top 10 diagnoses in the MEPS among adult, non-disabled Medicaid patients in three settings–inpatient (top panel), emergency department (middle panel), and outpatient (bottom panel). Medicaid excludes individuals who are enrolled in both Medicare and Medicaid. Total share of revenues is the share of total reimbursements for each condition across *all* payers.

Table 2 presents unadjusted ratios of uninsured and privately insured reimbursements to Medicaid reimbursement along with 95 percent confidence intervals for the top 10 diagnoses in each hospital setting. In the inpatient and emergency department settings, Medicaid reimbursements are statistically significantly higher than payments from the uninsured for all top-10 conditions. On average, the uninsured paid 14 cents for every dollar that Medicaid pays. The result was the same in the emergency department setting; the uninsured pay less than Medicaid for all 10 conditions, and 40 cents per Medicaid dollar on average. The ratio of uninsured to Medicaid reimbursement for the two outpatient conditions for which reimbursement from the uninsured was higher than Medicaid ranges from 1.366 (95% CI: 1.340 – 1.392) to 1.563 (95% CI: 1.527 – 1.599). The ratio of private to Medicaid payments was greater than one for all conditions in the emergency department or outpatient settings but ranged from 0.656 (95% CI: 0.631 – 0.669) to 0.87 (95% CI: 0.859 – 0.880) for three inpatient conditions.

Table 2 also presents results from our break-even crowd-out analysis. For nine of the top 10 inpatient diagnoses, the estimated break-even crowd-out rate exceeded 50 percent. However, for one condition (depressive disorder), crowd-out levels that are high within the range of what has been estimated for previous expansions of public coverage would result in lost revenue (39.6%). For nearly all top10 emergency department diagnoses, the break-even crowd-out rates were high, but within the range of previously estimated rates. For two of the top 10 outpatient diagnoses

(Unspecified Joint Disorders and Unspecified Arthropathies) hospitals received less from Medicaid than from self-pay patients and, therefore, would be unambiguously worse-off regardless of crowd-out. For six of the top10 outpatient conditions, the estimated break-even crowd-out rates were within the range of previous estimates, with one (essential hypertension) as low as four percent.

Although informative, the unadjusted analyses in Tables 1 and 2 do not account for differences in the characteristics of those covered by Medicaid, private insurance, or without coverage at all. For example, our finding that hospitals receive less for asthma-related care from private insurers than from Medicaid could reflect the fact that Medicaid patients with asthma are sicker on average than privately insured patients with asthma. Table 3 presents regression-adjusted estimates averaged across all conditions. We find that hospitals receive $2,763 more for treating a private patient for a condition than for a Medicaid patient, while it receives $6,559 less for treating an uninsured patient than a Medicaid patient. Relative to average inpatient Medicaid reimbursements ($7,395), these estimates imply an uninsured to Medicaid reimbursement ratio of 11 percent ((7395-6559)/7395) and a private to Medicaid reimbursement ratio of 163 percent ((7395+2763)/7395).

For the emergency department setting, we find that hospitals receive $596 more for treating a private patient for a condition than for a Medicaid patient, while it receives $292 less for treating an uninsured patient than a Medicaid patient. Relative to average emergency department Medicaid reimbursements ($489), these estimates imply an uninsured to Medicaid reimbursement ratio of 40 percent ((489-292)/489) and a private to Medicaid reimbursement ratio of 303 percent ((489+596)/489). The results are similar for the outpatient setting. We find that hospitals receive $504 more for treating a private patient for a given condition than for a Medicaid patient, while it receives $226 less from an uninsured patient. Relative to average Medicaid outpatient reimbursements, the ratio of uninsured payments to Medicaid reimbursements is 41% ((385-226)/385) and the private to uninsured ratio is 320 percent ((385+504)/385).

Table 2. Relative Hospital Reimbursements by Patient Care Setting and Payer Type, Top 10 Conditions

	Inpatient					
	Uninsured-Medicaid Ratio		Private-Medicaid Ratio		Break-Event Crowd-Out Rate	
Condition	Ratio	95% CI	Ratio	95% CI	Ratio	95% CI
Depressive Disorder	0.342	(0.323 0.360)	2.041	(2.004 2.078)	0.387	(0.374 0.401)
Respiratory and Chest Symptoms	0.252	(0.240 0.263)	0.665	(0.648 0.682)	1.81	(1.671 1.95)
Diabetes Mellitus	0.122	(0.116 0.129)	1.213	(1.173 1.254)	0.804	(0.776 0.833)
Pneumonia	0.016	(0.015 0.016)	0.87	(0.859 0.880)	1.152	(1.138 1.166)
Acute Cerebrovascular Disease	0.058	(0.055 0.060)	1.049	(1.034 1.064)	0.95	(0.936 0.964)
Essential Hypertension	0.071	(0.068 0.075)	0.929	(0.918 0.940)	1.083	(1.069 1.097)
General Symptoms	0.137	(0.132 0.142)	1.315	(1.278 1.351)	0.733	(0.707 0.759)
Asthma	0.012	(0.011 0.012)	0.65	(0.631 0.669)	1.548	(1.506 1.590)
Acute Myocardial Infarction	0.242	(0.236 0.248)	0.847	(0.836 0.858)	1.252	(1.229 1.276)
Anxiety and Somatoform Disorders	0.118	(0.112 0.123)	1.534	(1.511 1.556)	0.623	(0.612 0.634)

Table 2. Continued

Emergency Department						
	Uninsured-Medicaid Ratio		Private-Medicaid Ratio		Break-Event Crowd-Out Rate	
Condition	Ratio	95% CI	Ratio	95% CI	Ratio	95% CI
Respiratory Symptoms	0.276	(0.272 0.281)	2.255	(2.231 2.280)	0.366	(.360 .371)
General Symptoms	0.299	(0.294 0.304)	2.812	(2.789 2.835)	0.279	(.276 .282)
Unspecified Injury	0.546	(0.538 0.554)	1.842	(1.821 1.864)	0.35	(.341 .359)
Essential Hypertension	0.471	(0.462 0.480)	3.651	(3.607 3.696)	0.166	(.163 .170)
Migraine	0.535	(0.525 0.544)	2.128	(2.104 2.151)	0.292	(.285 .299)
Unspecified Back Disorders	0.497	(0.489 0.506)	2.22	(2.190 2.251)	0.292	(.284 .300)
Asthma	0.209	(0.204 0.214)	1.461	(1.445 1.477)	0.632	(.623 .640)
Anxiety and Somatoform Disorders	0.462	(0.454 0.470)	1.962	(1.940 1.985)	0.358	(.351 .366)
Stomach Disorders	0.483	(0.473 0.492)	2.307	(2.286 2.328)	0.283	(.278 .289)
Diabetes Mellitus	0.23	(0.223 0.237)	2.454	(2.422 2.486)	0.346	(.340 .352)
Outpatient						
	Uninsured-Medicaid Ratio		Private-Medicaid Ratio		Break-Event Crowd-Out Rate	
Condition	Ratio	95% CI	Ratio	95% CI	Ratio	95% CI
Breast Cancer	0.227	(0.224 0.231)	2.477	(2.457 2.496)	0.343	(0.340 0.347)
Unspecified Joint Disorders	1.366	(1.34 1.392)	3.035	(2.996 3.074)	U>M	--
Unspecified Back Disorders	0.678	(0.654 0.703)	2.451	(2.412 2.489)	0.181	(0.135 0.228)
Diabetes Mellitus	0.369	(0.365 0.373)	1.773	(1.758 1.788)	0.449	(0.444 0.455)
Essential Hypertension	0.934	(0.911 0.958)	2.407	(2.385 2.428)	0.044	(-0.020 0.109)
Other and Unspecified Arthopathies	1.563	(1.527 1.599)	3.26	(3.222 3.297)	U>M	--
Depressive Disorder	0.066	(0.065 0.068)	1.091	(1.071 1.112)	0.911	(0.893 0.929)
Renal Failure	0.071	(0.069 0.073)	1.803	(1.785 1.821)	0.536	(0.531 0.542)
Episodic Mood Disorders	0.016	(0.016 0.017)	1.472	(1.457 1.487)	0.676	(0.669 0.683)
Anxiety and Somatoform Disorders	0.919	(0.898 0.941)	1.993	(1.970 2.016)	0.075	(-14.645 14.795)

NOTE: 2001-2012 Medical Expenditure Panel Survey. The figure presents average reimbursements ratios for the uninsured and privately insured to Medicaid for the top 10 diagnoses in the MEPS among adult, non-disabled Medicaid patients in three settings–inpatient (top panel), emergency department (middle panel), and outpatient (bottom panel). The 95% confidence interval for each ratio is also displayed. Medicaid excludes individuals who are enrolled in both Medicare and Medicaid. All ratios are based on averages in Table One and are therefore weighted by the MEPS final population-based survey weight. U>M indicates that the uninsured pay more than Medicaid.

Table 3. Regression-Adjusted Relative Reimbursements by Patient Care Setting and Payer Type, All Conditions

	Inpatient			Emergency Department			Outpatient		
Controls	None	Demographic, Region and Year	Demographic, Region, Year, ICD-9 Dummies	None	Demographic, Region and Year	Demographic, Region, Year, ICD-9 Dummies	None	Demographic, Region and Year	Demographic, Region, Year, ICD-9 Dummies
Private	3,874*	2,703*	2,763*	620*	589*	596*	579*	534*	504*
	(351)	(421)	(574)	(23)	(25)	(26)	(25)	(29)	(29)
Medicaid	-5,677*	-6,062*	-6,559*	-282*	-286*	-292*	-187*	-239*	-226*
	(558)	(576)	(729)	(24)	(25)	(26)	(32)	(35)	(35)
Constant	7,395*	-388	11,109*	489*	240	240	385*	-148	528*
	(301.7)	(1,906)	(3,929)	(20)	(101)	(223)	(23)	(128)	(192)
Observations	15847	15847	15847	36803	36803	36803	75045	75045	75045
R-squared	0.027	0.063	0.103	0.068	0.085	0.116	0.017	0.025	0.081

Note: The figure displays results of an ordinary least squares regression of total payments on insurance dummies (Privately Insured, Uninsured) with Medicaid as the omitted category. The sample includes only Medicaid, privately insured, or uninsured respondents. Dual-eligible Medicaid recipients are excluded. Moving across the table within each setting, we add demographic characteristics (age, education, race-ethnicity and marital status), region dummies and year dummies, and then ICD-9 3-digit condition code dummies. Each regression uses the MEPS population weight. * Indicates statistical significance at the 0.01 percent level.

In terms of the break-even crowd-out rate, our estimates imply that revenues could fall if crowd-out rates exceed 70 percent (6559/(2763- -6559)) in the inpatient setting. In the emergency department and outpatient settings, our implied break-even crowd-out rates are: 33 (292/(596- -292)) and 31 (225/(504- -225)) percent, respectively.

The results of our uncompensated care and hospital revenue simulation using the results of Table 3 are presented in Table 4. In the first column, uncompensated care falls by up to 30 percent across each setting, regardless of the fraction of uninsured patients that take-up Medicaid. At very low levels of crowd-out (5%), the lost revenue from some patients substituting Medicaid for private insurance is small relative to the gain in revenue from uninsured patients gaining Medicaid. However, within each category of Medicaid take-up, the increase in simulated revenue decreases with the crowd-out rate as the hospital receives fewer reimbursements from private insurers. In the inpatient setting, even if half of those patients who take-up Medicaid were formerly privately insured, or a crowd-out rate of 50 percent, the lost revenue from crowd-out is smaller than the

revenue gained from the uninsured taking up Medicaid. In the outpatient and emergency department settings, simulated revenues increase with moderate levels of crowd-out (<20%) and high take-up of Medicaid (>50%). However, simulated revenues fell in both the emergency department and outpatient settings when crowd-out was high and Medicaid take-up was low. For example, if only half of the uninsured take up Medicaid and half of all those who took up Medicaid formerly held private insurance, then simulated emergency department revenues fell by 1.3 percent in the outpatient setting.

Table 4. Simulated Change in Uncompensated Care and Revenues under Medicaid Expansion

Setting	Medicaid Take-Up	Change in Uncompensated Care	Change in Revenues Under Different Levels of Crowd-Out			
			5%	10%	20%	50%
Inpatient	25%	-9%	1.9%	1.8%	1.5%	1.2%
	50%	-17%	4.0%	3.9%	3.6%	3.3%
	75%	-26%	6.1%	6.0%	5.7%	5.4%
	100%	-34%	8.2%	8.1%	7.8%	7.5%
Emergency Department	25%	-6%	2.3%	1.0%	-1.2%	-3.9%
	50%	-11%	6.0%	4.7%	2.6%	-0.2%
	75%	-17%	9.8%	8.5%	6.3%	3.6%
	100%	-23%	13.5%	12.2%	10.1%	7.3%
Outpatient	25%	-6%	0.6%	0.2%	-0.5%	-1.3%
	50%	-12%	1.7%	1.3%	0.6%	-0.3%
	75%	-19%	2.8%	2.4%	1.7%	0.8%
	100%	-25%	3.9%	3.4%	2.8%	1.9%
Total	25%	-7%	1.7%	1.3%	0.7%	0.0%
	50%	-15%	3.7%	3.3%	2.8%	2.0%
	75%	-22%	5.7%	5.4%	4.8%	4.1%
	100%	-30%	7.8%	7.4%	6.8%	6.1%

Note: The table displays results of the uncompensated care and revenue simulation. To simulate the impact of various combinations of take-up and crowd-out on uncompensated care we

estimated baseline uncompensated care, equal to the sum of all charges for uninsured patients, less self-pay amounts, and baseline revenues, equal to the sum of all payments for Medicaid and privately insured patients as well as self-pay amounts from the uninsured. For each combination of take-up and crowd-out we calculated the number of people who would switch from uninsured to Medicaid, or private to Medicaid. For uncompensated care, we multiplied the number of uninsured people who would need to switch to Medicaid for each take-up rate by the uninsured regression coefficient in Table 3 and added this number to baseline uncompensated care. For revenues, we multiplied the number of uninsured and privately insured people who would need to switch to Medicaid by the uninsured or private regression coefficient in Table 3, multiplied by -1, and added it to baseline revenues.

Discussion

Early analyses of the ACA have found that Medicaid expansion has reduced uncompensated care (Dranove, Garthwaite and Ody, 2016; Cunningham et al., 2016), yet, as we highlight above, some hospitals have failed to see improvements in operating profits (Innes, 2015). The contribution of this paper is to describe the relationship between changes in coverage, hospital payer mix, and hospital revenues by focusing on two channels: differences in payments between payers and substitution of private insurance for Medicaid coverage through crowd-out.

We found that, in general, Medicaid reimbursement is more generous than self-payments from the uninsured and private reimbursements are more generous than Medicaid reimbursements. Our analysis suggests that for a given condition, hospitals receive nine times as much revenue from Medicaid as they do from the uninsured in the inpatient setting, and roughly 2.5 times as much in the outpatient and emergency department settings. Additionally, we find that it would take crowd-out rates in excess of 70 percent to reduce revenues in the inpatient setting, where over half of hospital revenue is generated (American Hospital, 2015). We do find average break-even crowd-out rates for the outpatient and emergency department settings that are within the range of previously estimated crowd-out rates of earlier Medicaid expansions for low-income children and families (30%). Although some early evidence suggests little crowd-out, the extent of crowd-out under the ACA's Medicaid expansion is still unclear (Frean, Gruber and Sommers, 2016).

Our analysis suggests the financial implications of the Medicaid expansion for hospitals likely depend on the extent of crowd-out and also the fraction of revenue generated in each of the studied hospitals settings. Although we find that revenues are largely robust to crowd-out in the inpatient setting, substituting private revenue for Medicaid reimbursements could diminish revenue in the outpatient setting.

In addition to the two channels discussed above, there are several other ways that Medicaid expansion may affect hospital margins. If a hospital is at capacity, then patients with Medicaid may displace patients with private insurance. Because Medicaid reimbursements are lower than reimbursements from private insurers for nearly all conditions, expansion can result in lower revenues and margins. Financial performance could also be affected by states' rate cuts to hospitals or ACA-mandated reductions in Disproportionate Share Hospital payments. Scheduled to take place in 2017, these cuts will be largest for states that already receive a high fraction of federal

Medicaid reimbursements in the form of DSH payments, do not target DSH payments to hospitals with high Medicaid populations or uncompensated care, and see a reduction in the uninsured rate. The impact on operating margins will likely be strongest for hospitals in states that are not expanding Medicaid because DSH payments will fall as the middle and high income uninsured gain coverage through Exchanges while hospitals will see little change in the demand for uncompensated care from the low-income uninsured population. A recent study found that hospitals in states that are not expanding Medicaid were more likely to be both eligible for DSH payments and have low operating margins (Cole et al., 2014).

The impact of high relative reimbursement and crowd-out will likely vary with the changes in payer mix experienced at individual hospitals and hospital and market characteristics. While the dataset used for this study does not allow us to conduct a hospital-level analysis, future work should explore the heterogeneous impact of Medicaid expansion on hospital financial status. Additionally, the impact of these channels on hospital financial status in states that did not expand Medicaid could also be affected for two reasons. First, in what is called the "woodwork effect," uninsured and privately insured individuals may enroll in Medicaid as they discover they are eligible for Medicaid during open enrollment periods for the health insurance marketplaces (Frean, Gruber and Sommers, 2016). Increases in Medicaid coverage in some states that have not expanded Medicaid under the ACA suggests that this may be happening (Sommers et al., 2015, Nikpay, Buchmueller and Levy, 2016b). Second, many marketplace enrollees are selecting high-deductible health plans or narrow network plans, which may reduce the amount of payment hospitals receive from privately insured patients, either because patients accumulate unpaid medical debts or because insurers provide lower reimbursements.

Limitations

The conclusions of our analysis are subject to several caveats due to limitations of our study design and data. First, because insurance coverage is an endogenous variable, our regression estimates represent correlations, not causal effects. If Medicaid enrollees are sicker on average than uninsured or privately insured patients, conditional on diagnosis, Medicaid payments cover even less of the cost of treating Medicaid patients than the ratio of payments suggests. We adjust for age, sex, and race and ethnicity in our regressions; however, other unobservable factors may influence the relative difference in reimbursements. Second, because it is not possible in the MEPS data to identify states, our estimates represent national averages. Thus, even though Medicaid payment rates vary substantially across states, we are not able to investigate the implications of these differences. Third, our estimates do not incorporate lump-sum hospital payments that hospitals receive to defray the costs of providing care to the uninsured (Bernard et al., 2012). These payments should reduce the estimated difference between payments from the uninsured and other payers. Finally, our analysis was at a population-level rather than the hospital level. Because the patient composition of hospitals varies, the result of Medicaid expansion may differ across hospitals.

Conclusion

Hospitals argued forcefully for Medicaid expansion in the hopes that it would improve financial position by reducing uncompensated care. Although early evidence suggests that uncompensated care is indeed falling, the impact of the expansion on financial position is unclear. We demonstrate that the financial impact of Medicaid expansion on hospitals will depend on the extent to which new Medicaid patients would otherwise have been uninsured or would have had private insurance.

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Appendix

Detailed notes on dataset construction

The analysis dataset for this study was constructed from the 2001-2012 hospital inpatient stays, emergency department visits, and outpatient visits household component event files (downloaded here: http://meps.ahrq.gov/data_stats/download_data_files.jsp). The MEPS event files provide dates of service, payments the facility received from 12 payer sources, and up to 4 ICD-9 codes associated with the event. The payment sources are self or family, Medicare, Medicaid, private insurance, Veterans Administration or CHAMPVA, TRICARE, other federal sources, state and local government sources, Workers' Compensation, other private insurance, other public insurance, and other insurance. The MEPS sums these 12 sources to create a variable of total payment received by the facility in the inpatient (IPFXP'year'X), emergency department (ERFXP'year'X), and outpatient (OPFXP'year'X)(Agency for Healthcare Research and Quality Center for Financial Access and Cost Trends, 2014a, b, c). Payment data consist of the survey respondent's self-report of amounts paid to the hospital and is supplemented by information from medical providers for a sample of events. Where both self-reported and provider-reported information is missing, expenditures are imputed. Data from the household component and the medical provider components of the survey are then used to impute expenditures for each event. We used the first ICD-9 code listed to assign the visit to a condition and adjusted all expenditures to be expressed in 2014 dollars using the Consumer Price Index.

We used data on the 12 payment sources listed above to categorize the event as covered by Medicaid, Medicare, private insurance, or no source of coverage. Specifically, we categorized the event as covered by Medicaid if any Medicaid ('setting'FMC'year'X) reimbursement was received and private if any private reimbursement was received ('setting'FPV'year'X). This excludes other forms of private insurance, such as workers compensation or auto insurance ('setting'FOR'year'X, 'setting'FOT'year'X, 'setting'FWC'year'X). To eliminate individuals who were eligible for both Medicaid and Medicare, we excluded any events with any Medicare reimbursement ('setting'FMR'year'X). We categorized events as having no source of coverage if the hospital only received reimbursement from the patient ('setting'FSF'year'X).
From the household component full year consolidated files, we obtained the income-to-poverty ratio for the family (POVCAT'year') and identified survey respondents in families with incomes below 200% FPL (Agency for Healthcare Research and Quality Center for Financial Access and Cost Trends, 2014d). We then merged these data to the cleaned event files to create the final analysis dataset.