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RESEARCH ARTICLE

Do People with Health Insurance Coverage Who Live in Areas with High Uninsurance Rates Pay More for Emergency Department Visits?

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Objective. To investigate the relationship between the percent uninsured in a county and expenditures associated with the typical emergency department visit.

Data Sources. The Medical Expenditure Panel Survey linked to county-level data from the American Community Survey, the Healthcare Cost and Utilization Project, and the Area Health Resources Files.

Study Design. We use a nationally representative sample of emergency department visits that took place between 2009 and 2013 to estimate the association between the percent uninsured in counties and the amount paid for a typical visit. Final estimates come from a diagnosis-level fixed-effects model, with additional controls for a wide variety of visit, individual, and county characteristics.

Principal Findings. Among those with private insurance, we find that an increase of 1 percentage point in the county uninsurance rate is associated with a \$20 increase in the mean emergency department payment. No such association is observed among visits covered by other insurance types.

Conclusions. Results provide tentative evidence that the costs associated with high uninsurance rates spill over to those with insurance, but future research needs to replicate these findings with longitudinal data and methods before drawing causal conclusions. Recent data on changes in area uninsurance rates following the ACA's insurance expansions and subsequent changes in emergency department expenditures afford a valuable opportunity to do this.

Key Words. Health care costs, health care financing/insurance/premiums, health care organizations and systems

With the full implementation of the Patient Protection and Affordable Care Act (ACA), an estimated 20 million people who previously had no health insurance gained coverage (Uberoi, Finegold, and Gee 2016). Although the ACA's coverage expansion provisions were motivated in large part by the

hardships experienced by uninsured people, it was also commonly argued that the large number of uninsured people in the United States was driving up the cost of medical care for everyone, including individuals with insurance. In particular, the “individual mandate” of the Affordable Care Act, which required most people to obtain insurance coverage or face a fine, was based at least in part on the idea of such a “spillover” effect. For example, the federal government’s webpage, healthcare.gov, states, “When someone without health coverage gets urgent—often expensive—medical care but doesn’t pay the bill, everyone else ends up paying the price” (U.S. Centers for Medicare & Medicaid Services 2014). Despite the ubiquity of statements similar to this, the underlying idea has limited empirical support. Yet there was an estimated \$85 billion in uncompensated care provided by hospitals in 2013 (Coughlin et al. 2014), so it seems reasonable to assume, as many have done, that hospitals partially offset the cost of providing uncompensated care through revenues generated from care paid for by the insured. But evidence supporting this assumption is sparse.

Recognizing the financial burden placed on hospitals that serve poor and uninsured populations, the federal government dispersed \$11 billion to states in 2014, who were required to use it to reimburse qualifying hospitals for uncompensated care (Neuhausen et al. 2014). These “Disproportionate Share Hospital” (DSH) payments help many safety-net hospitals maintain positive operating margins, which enable them to continue providing health care for disadvantaged and underserved communities. Ideally, this program reduces the necessity for hospitals to pass on the costs of uncompensated and undercompensated care to other patients. But the volume and cost of uncompensated care are vastly larger than available DSH payments. Even with DSH payments, operating margins for safety-net hospitals nationwide are only 2.2 percent, on average, and in the absence of DSH payments, they would actually be negative (Zaman, Cummings, and Laycox 2012). Therefore, it is still possible that, despite the DSH program, at least some hospitals may need to defray the cost of uncompensated care by pursuing higher revenue among their insured patients.

Another reason to examine the possibility of “spillover” empirically, rather than assume it, is that hospitals have not been able to use “cost shifting”

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in response to other financial strains in the past. “Cost shifting” is when medical providers charge one group of patients more *in response to* a decrease in another group’s payment rate (Frakt 2011). Research suggests that hospitals did not respond to Medicare rate cuts by increasing rates for privately insured patients (Frakt 2011, 2014; White 2013). However, uncompensated care provided in the emergency department setting may prompt a different response than reduced Medicare rates in the inpatient setting. Inpatient stays can often be planned in advance, allowing time for insured patients to find in-network providers with whom insurance companies have negotiated prices. Urgent care, in contrast, is unplanned, and therefore, patients may be less able to choose a provider based on network status, price, or quality. It is plausible, therefore, that hospital emergency departments are able to pass some of the costs associated with providing care to the uninsured onto patients with insurance, whereas hospital inpatient departments were unable to do so in response to Medicare rate cuts for inpatient care.

Adjusting prices is not, however, the only mechanism by which hospitals might recoup the costs associated with serving communities with high uninsurance rates; “spillover” is a broader phenomenon than “cost shifting.” Differential treatment by insurance status, not just differential prices, may give rise to a positive association between uninsurance rates and the amount paid for emergency department visits. It is plausible that hospitals more frequently recommend expensive procedures or a high volume of services to individuals with insurance compared to those without insurance, especially when the standard of care is not clear. For example, a privately insured patient coming to an emergency department for a minor head injury may be more likely to have a CATscan or other expensive imaging procedure than a similar patient without insurance coverage.

While studies have found that the percent uninsured in an area affects access, quality, and other aspects of care among the insured (Pagan and Pauly 2006; Pagan, Balasubramanian, and Pauly 2007; Pauly and Pagan 2007; Pagán et al. 2008; Gresenz and Escarce 2011), evidence for a “spillover” with respect to expenditures is limited and mixed. One study found that private insurance premiums are strongly affected by the amount of uncompensated care provided to the uninsured, reporting that family premiums for private insurance were \$922 higher in California in 2005 than they would have been in the absence of uncompensated care to the uninsured, an effect of about 8 percent (Stoll et al. 2005). In contrast, two other studies found that uncompensated care results in an increase in insurance premiums of 2 percent or less (Kessler 2007; Hadley et al. 2008).

Thus, because current evidence is limited and mixed, the often-used argument that the cost of providing care to the millions of uninsured people in the United States spill over to those with insurance requires empirical scrutiny. To this end, we examine the association between the percent of people who do not have insurance in counties and the amount paid for a typical emergency department visit, net of a variety of visit, person, and community characteristics. Emergency departments are a particularly important context in which to examine the possibility of spillover because by law, they must provide essential treatment to everyone regardless of insurance status or ability to pay. For some hospitals, emergency departments may therefore be a source of financial risk to which they must respond. Further, recent changes in the DSH program under the ACA make this a particularly timely study. Assuming expansions in the availability of insurance coverage would reduce uncompensated care and increase hospital revenues, the ACA included a sizable reduction in DSH payments. Beginning in 2017, federal DSH payments will be reduced by 16 percent and for fiscal years 2018–2020 will be further reduced by 41 percent of current spending. There is concern, however, that declines in uncompensated care will not be sufficient to offset the cuts in DSH payments (Neuhausen et al. 2014). Some hospitals may therefore feel increased pressure to pass the cost of providing uncompensated care onto insured patients.

We address three research questions. First, do people who live in counties with high uninsurance rates pay more for a typical emergency department visit than those in counties with low uninsurance rates? Second, if such an association exists, how does it differ by the type of insurance coverage individuals have? We expect that any spillover effect will be concentrated among individuals with private insurance because it is likely more difficult for hospitals to negotiate prices with Medicaid and Medicare than with private insurance plans. Finally, to what extent are higher emergency department expenditures borne by individuals in the form of out-of-pocket obligations and to what extent are they born by insurance plans?

METHODS

Data Sources

Information on emergency department events and the characteristics of those who experience them come from 5 years of data from the Medical Expenditure Panel Survey (MEPS), 2009–2013. MEPS is a nationally representative household survey of the U.S. noninstitutionalized population that collects

information on health care access, use, and expenditures. Expenditures reported by household respondents are verified, adjusted, and, in some cases, imputed based on information obtained from a follow-back survey of medical providers.

The size of the uninsured population in each county comes from the American Community Survey (ACS) administered by the U.S. Census Bureau. We used the single-year ACS files corresponding to the year in which visits reported in MEPS took place. This requires us to focus on visits experienced by individuals living in counties with populations of at least 65,000. Our findings are therefore generalizable to emergency department visits experienced by individuals living in the 828 largest U.S. counties, accounting for 86 percent of all visits nationwide. County-level hospital wage rates and measures of hospital market competition come from the Healthcare Cost and Utilization Project (Wong, Zhan, and Mutter 2005). Other county characteristics such as poverty rates and infant mortality rates come from the Area Health Resource File, which aggregates county-level information from many sources.

About 5 percent of emergency department visits resulted in hospital admissions, and in such cases, payments for emergency care are grouped with payments for inpatient care. For these visits, we therefore use a fraction of the expenditures from the associated inpatient event equivalent to one night's stay. Our findings are robust to other ways of dealing with this, including deleting emergency department visits with inpatient stays entirely, adding two or three nights worth of inpatient expenditures instead of one, and using a multiple imputation technique to complete observations with missing expenditures. The final sample consists of 26,731 emergency department visits that took place between 2009 and 2013.

Variables

The main dependent variable in our analysis is the total expenditure for each emergency department event. This variable is the sum of direct payments for emergency department visits, including out-of-pocket payments and payments by private insurance, Medicaid, Medicare, and all other sources. All amounts are adjusted to 2013 dollars, and dichotomous variables for year are included in our analyses. We also analyze payments by source (insurance vs. out-of-pocket). The main independent variables in our analysis are the percent of county residents who are uninsured (hereafter referred to as the county "uninsurance rate") and individual insurance status at the time of the emergency department visit. Individuals were categorized as having private

insurance only, Medicare in combination with any other type of insurance, Medicaid only, or no insurance coverage.

There are several variables at the visit level, person level, and county level that may be related to both the amount paid for an emergency department visit and the county uninsurance rate. One such variable is the intensity of medical care required during a visit. At the visit level, we include dichotomous variables that capture the general purpose of the visit: "diagnosis or treatment," "accident or injury," "postoperative follow-up," "pregnancy-related," or "other." Including individual health status is another way to control for the intensity of medical care required at an emergency department visit, as comorbidities often make medical care more complex and expensive. Subjective health status is captured by dichotomous variables measuring health as "poor" to "excellent" on a five-point Likert scale. Also included is a series of dichotomous variables indicating whether an individual has the following chronic conditions: angina, asthma, coronary heart disease, diabetes, emphysema/COPD, high blood pressure, myocardial infarction, other heart disease, and stroke. To further control for differences in medical severity, we estimate fixed-effects models that account for between-visit differences in diagnoses. A more detailed discussion of this is in the following section.

In addition to health status and chronic conditions, individual-level control variables include age, sex, race and ethnicity, and household income relative to the federal poverty line. All of these characteristics are known to be related to medical expenditures and may also be related to the likelihood of residing in counties with high uninsurance rates.

Several county characteristics may be associated with both the uninsurance rate and mean per-visit expenditures on emergency care. Emergency departments in disadvantaged counties with high uninsurance rates may have case mixes that are more severe and expensive compared with emergency departments in other areas. To account for this possibility, we include variables for the poverty rate, the infant mortality rate, whether a county was in a metropolitan statistical area (MSA), and median age.

Finally, there are likely systematic differences in hospital market characteristics across counties that are related to uninsurance rates. Low hospital competition and high medical prices in counties will result in higher insurance premiums that, in turn, may drive uninsurance rates up. At the same time, more expensive emergency department visits in such counties may simply be a reflection of weak competition and high prices, rather than any effort on the part of hospitals to recoup the costs associated with uncompensated care. If so, we risk attributing any association between county uninsurance rates and emergency

department expenditures to “spillover” when it is actually due to the confounding effects of unobserved differences in the price of medical care. To address this possibility, we include variables that measure differences in the supply of emergency room care, the concentration of hospital markets, and a proxy for overall hospital prices. The number of emergency care physicians per 10,000 county residents captures differences in the supply of emergency services. The Area Wage Index, computed by the Center for Medicare and Medicaid Services, captures the hospital wage level in an area relative to the national average and serves as a proxy for overall hospital prices. The Herfindahl-Hirschman Index (HHI), which is the sum of squared market shares for all of the hospitals in a county, captures differences in hospital market concentration. For HHI, a hospital’s market share is calculated as the number of discharges from that hospital divided by the total number of discharges in the area. The HHI ranges from the zero to one, with larger numbers representing more concentration, or less competition. For a detailed discussion of these measures and the data on which they are based, see Wong, Zhan, and Mutter (2005).

Analytic Approach

Despite the control variables discussed in the previous section, unobserved differences in the medical severity of a visit may bias our results. For all outcomes, we therefore estimate two models: a conventional OLS model and a diagnosis-level fixed-effects model. We use the Clinical Classification Software (CCS) codes, based on the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM). The ICD-9-CM’s codes—over 14,000 diagnosis codes and 3,900 procedure codes—are collapsed into a smaller number of clinically meaningful categories. There are 225 unique CCS codes represented in the MEPS sample. Estimates from the fixed-effects models are identified entirely by within-diagnosis variance and therefore account for a sizable fraction of the variance in medical severity across visits. As a sensitivity test, we also estimated our models using generalized linear models with both Gamma and Gaussian distribution families and a logarithmic link function and found them to produce similar results.

RESULTS

Overall, the average amount paid per emergency department visit between 2009 and 2013 was \$1,182, but there were large differences by insurance status

(Table 1). The average expenditure on an emergency department visit was \$1,507 for individuals with private insurance but only \$547 for individuals with Medicaid. Payments for visits experienced by individuals with Medicare or with no insurance were also smaller than those experienced by individuals with private insurance at \$1,329 and \$998, respectively.

Compared to people with private insurance, people on Medicaid and the uninsured were younger, had lower incomes, were more likely to be Hispanic or black, and reported being less healthy. People on Medicaid were more likely to be women. People on Medicare were older, had lower incomes, were more likely to be white, and reported worse health with more chronic conditions than those on private insurance.

Table 2 shows coefficient estimates from the conventional and fixed-effects models on total expenditures. Results from the conventional model indicate that, among those with private insurance, a percentage point increase in the county uninsurance rate is associated with a \$21 increase in the amount paid for a typical emergency department visit. Estimating the same model with CCS fixed-effects reduces this estimate but only by \$1. This provides some confidence that our results are not driven primarily by differences in the medical severity of visits. Consistent with our expectation, the negative association between the county uninsurance rate and per-visit emergency department expenditures is significant only among those with private insurance.

Figure 1 illustrates the magnitude of the spillover effect. The graph shows predicted mean expenditures for emergency department visits along the y -axis and the county uninsurance rate along the x -axis. There are four lines, each representing one insurance group, and the interquartile range of the county uninsurance rate is indicated by the dashed, vertical lines. The x -axis is constrained to the first and the 99th percentile of the county uninsurance rate within the sample (i.e., there are no out-of-sample predictions).

The line representing per-visit emergency department expenditures for those with private insurance clearly stands out; it slopes steeply upward, while the other lines show no upward slope. Among the privately insured, when all observed characteristics and CCS codes are taken into account, the estimated "spillover effect" across the interquartile range of the county uninsurance rate (from 10.4 percent uninsured to 17.4 percent uninsured) is \$142.

Table 3 shows the coefficient estimates from CCS fixed-effects models on per-visit emergency department expenditures separately by source of payment: total, out-of-pocket, and insurance. Results indicate that the association between the county uninsurance rate and per-visit emergency department expenditures is significant both with respect to out-of-pocket expenditures

Table 1: Means for All Variables by Insurance Status

	Overall	<i>Insurance Status at the Time of Visit</i>			
		<i>Private</i>	<i>Medicare</i>	<i>Medicaid</i>	<i>Uninsured</i>
Total payment	\$1,181.63 (\$19.22)	\$1,507.22 (\$33.08)	\$1,329.28*** (\$40.16)	\$546.75*** (\$15.95)	\$998.24*** (\$46.30)
Insurance payment	\$1,068.54 (\$18.58)	\$1,363.99 (\$31.56)	\$1,278.45 (\$38.82)	\$538.21*** (\$15.96)	\$722.75*** (\$42.77)
Out-of-pocket payment	\$113.09 (\$4.62)	\$143.23 (\$5.71)	\$50.82*** (\$7.28)	\$8.53*** (\$1.12)	\$275.50*** (\$18.41)
Percent uninsured	14.20% (0.18)	13.62% (0.18)	13.71% (0.23)	14.72%*** (0.28)	15.69%*** (0.27)
<i>Year of Visit</i>					
2009	0.19 (0.01)	0.20 (0.01)	0.17 (0.01)	0.19 (0.01)	0.22 (0.01)
2010	0.19 (0.01)	0.19 (0.01)	0.18 (0.01)	0.19 (0.01)	0.18 (0.01)
2011	0.20 (0.00)	0.21 (0.01)	0.18* (0.01)	0.20 (0.01)	0.19 (0.01)
2012	0.20 (0.01)	0.20 (0.01)	0.22 (0.01)	0.21 (0.01)	0.19 (0.01)
2013	0.22 (0.01)	0.21 (0.01)	0.25* (0.01)	0.22 (0.01)	0.22 (0.01)
<i>Insurance Status at Time of Visit</i>					
Private	0.39 (0.01)				
Medicare	0.24 (0.01)				
Medicaid	0.21 (0.01)				
Uninsured	0.16 (0.00)				
<i>Reported Visit Category</i>					
Diagnosis or treatment	0.45 (0.01)	0.41 (0.01)	0.46*** (0.01)	0.49*** (0.01)	0.51*** (0.01)
Accident or injury	0.50 (0.01)	0.55 (0.01)	0.52* (0.01)	0.45*** (0.01)	0.45*** (0.01)
Postoperative follow-up	0.01 (0.00)	0.01 (0.00)	0.01 (0.00)	0.01 (0.00)	0.01 (0.00)
Pregnancy-related	0.02 (0.00)	0.02 (0.00)	0.00*** (0.00)	0.04*** (0.00)	0.01 (0.00)
Other	0.01 (0.00)	0.01 (0.00)	0.01 (0.00)	0.01 (0.00)	0.02 (0.00)
Sex (male)	0.44 (0.01)	0.46 (0.01)	0.42* (0.01)	0.40*** (0.01)	0.44 (0.01)

Continued

Table 1. *Continued*

	<i>Overall</i>	<i>Insurance Status at the Time of Visit</i>			
		<i>Private</i>	<i>Medicare</i>	<i>Medicaid</i>	<i>Uninsured</i>
Age	39.49 (0.39)	34.25 (0.35)	66.25*** (0.67)	22.31*** (0.51)	34.70 (0.42)
<i>Race and Ethnicity</i>					
Non-Hispanic white	0.62 (0.01)	0.70 (0.01)	0.75** (0.01)	0.39*** (0.02)	0.51*** (0.02)
Non-Hispanic black	0.17 (0.01)	0.12 (0.01)	0.13 (0.01)	0.26*** (0.02)	0.21*** (0.02)
Hispanic, any race	0.16 (0.01)	0.12 (0.01)	0.07*** (0.01)	0.28*** (0.02)	0.23*** (0.02)
Non-Hispanic, other race	0.03 (0.00)	0.02 (0.00)	0.02 (0.00)	0.04* (0.01)	0.03 (0.01)
<i>Income Relative to Poverty</i>					
<100%	0.23 (0.01)	0.04 (0.00)	0.17*** (0.01)	0.56*** (0.02)	0.36*** (0.02)
100–125%	0.06 (0.00)	0.02 (0.00)	0.08*** (0.01)	0.09*** (0.01)	0.08*** (0.01)
125–200%	0.16 (0.00)	0.11 (0.01)	0.21*** (0.01)	0.17*** (0.01)	0.20*** (0.01)
200–400%	0.28 (0.01)	0.36 (0.01)	0.28*** (0.01)	0.15*** (0.01)	0.25*** (0.01)
>400%	0.27 (0.01)	0.46 (0.01)	0.27*** (0.02)	0.02*** (0.00)	0.11*** (0.01)
<i>Self-Reported Health</i>					
Excellent	0.18 (0.01)	0.24 (0.01)	0.07*** (0.01)	0.23 (0.01)	0.15** (0.01)
Very good	0.24 (0.00)	0.30 (0.01)	0.17*** (0.01)	0.21*** (0.01)	0.22*** (0.01)
Good	0.29 (0.01)	0.28 (0.01)	0.30 (0.01)	0.27 (0.01)	0.33 (0.01)
Fair	0.19 (0.00)	0.13 (0.01)	0.30*** (0.01)	0.18*** (0.01)	0.20*** (0.01)
Poor	0.10 (0.01)	0.05 (0.01)	0.17*** (0.01)	0.11*** (0.01)	0.11*** (0.01)
<i>County Characteristics</i>					
Percent in poverty	12.76 (0.20)	12.09 (0.21)	12.53** (0.21)	13.82*** (0.31)	13.35*** (0.26)
Infant mortality rate	6.59 (0.10)	6.44 (0.10)	6.56 (0.11)	6.73*** (0.12)	6.80*** (0.13)
Median age	37.17 (0.21)	37.05 (0.20)	37.72** (0.30)	36.98 (0.30)	36.85 (0.22)

Continued

Table 1. *Continued*

	Overall	Insurance Status at the Time of Visit			
		Private	Medicare	Medicaid	Uninsured
In metropolitan statistical area	0.93 (0.01)	0.94 (0.01)	0.93 (0.02)	0.92 (0.02)	0.92 (0.01)
Emergency physicians per capita	1.17 (0.03)	1.20 (0.04)	1.18 (0.03)	1.12 (0.04)	1.12 (0.04)
Hospital Wage Index	1.02 (0.01)	1.02 (0.01)	1.02 (0.01)	1.03 (0.01)	1.00*** (0.01)
Herfindahl-Hirschman Index	0.39 (0.01)	0.39 (0.01)	0.41 (0.02)	0.37 (0.02)	0.38 (0.02)

*Significantly different than private insurance, $p < 0.05$.
**Significantly different than private insurance, $p < 0.01$.
***Significantly different than private insurance, $p < 0.001$.

and insurance expenditures but, again, only for visits experienced by privately insured individuals. Among visits covered under private insurance, a 1 percentage point increase in the county uninsurance rate is associated with an increase in per-visit out-of-pocket expenditures of \$3.64 and an increase in insurance expenditures of \$16.70. In absolute terms, most of the \$20 increase in total expenditures associated with a percentage point increase in the county uninsurance rate is paid by insurance plans. But in terms relative to the proportion of total expenditures that is paid out of pocket, the \$3.64 increase in out-of-pocket payments is disproportionate. The average emergency department visit among the privately insured costs \$1,507 and \$143 of this, or 9.5 percent, is paid out of pocket (Table 1). In contrast, the \$3.64 increase in out-of-pocket expenditures associated with an increase in the county uninsurance rate constitutes nearly 18 percent of the increase in total expenditures. Thus, the county uninsurance rate is not only positively associated with the mean payment for emergency department visits; it is also positively associated with the proportion paid out of pocket.

DISCUSSION

We found that living in a county with a high percentage of uninsured residents is associated with more expensive emergency department visits, even after controlling for a variety of visit, individual, and county characteristics. Consistent with the idea of a spillover, this association is concentrated entirely among

Table 2: Regression Coefficients (Standard Errors) from Models Predicting Total Per-Visit Emergency Department Payments

	OLS	CCS Fixed Effects
<i>Insurance-Specific Marginal Effects of Percent Uninsured[†]</i>		
Private	21.46** (6.67)	20.34** (6.66)
Medicare	8.14 (8.17)	2.64 (7.66)
Medicaid	3.58 (3.84)	1.39 (3.94)
Uninsured	-5.07 (9.49)	-7.13 (9.92)
<i>Insurance Status at the Time of Visit (Reference: Privately Insured)</i>		
Medicare	-268.06 (151.50)	-255.50 (147.25)
Medicaid	-447.94*** (98.57)	-388.76*** (97.62)
Uninsured	-25.02 (180.49)	22.88 (191.07)
<i>Year of Visit (Reference: 2009)</i>		
2010	43.54 (57.28)	23.09 (55.02)
2011	79.59 (52.04)	67.22 (48.63)
2012	73.08 (55.84)	48.30 (54.95)
2013	104.71* (48.86)	101.12* (45.28)
<i>Visit Category (Reference: "Other")</i>		
Diagnosis or treatment	150.82 (161.21)	136.71 (157.27)
Accident or injury	260.78 (161.74)	279.88 (158.79)
Postoperative follow-up	-241.59 (192.51)	-187.80 (183.37)
Pregnancy-related	264.59 (203.48)	11.99 (266.95)
Sex (reference: female)	77.85* (39.37)	72.44 (40.53)
Age	8.80*** (1.22)	6.03*** (1.21)
<i>Race and Ethnicity</i>		
Non-Hispanic black	-76.57 (42.66)	-53.23 (40.16)
Hispanic, any race	4.34 (56.48)	1.84 (53.56)

Continued

Table 2. *Continued*

	<i>OLS</i>	<i>CCS Fixed Effects</i>
Non-Hispanic, other race	−85.67 (86.99)	−53.53 (86.14)
<i>Household Income Relative to Poverty (Reference: >400%)</i>		
<100%	−307.06*** (64.31)	−296.65*** (61.69)
100–125%	−253.48** (76.17)	−230.25** (74.12)
125–200%	−270.75*** (69.45)	−247.50*** (64.21)
200–400%	−191.53** (58.11)	−192.57*** (54.16)
<i>Self-Rated Health (Reference: Excellent)</i>		
Very good	86.60 (51.34)	66.40 (50.85)
Good	142.76** (51.44)	100.60 (51.69)
Fair	238.66*** (62.80)	161.67** (61.35)
Poor	275.47*** (82.34)	124.38 (79.84)
<i>County Characteristics</i>		
Percent in poverty	−10.22* (4.59)	−10.14* (4.57)
Infant mortality rate	0.07 (11.68)	−0.12 (10.94)
Median age	−2.58 (5.26)	−4.87 (5.01)
In metropolitan statistical area	10.52 (79.07)	3.21 (76.42)
Emergency physicians per capita	−65.33* (27.72)	−58.22* (27.34)
Hospital Wage Index	150.35 (124.30)	156.02 (125.17)
Herfindahl-Hirschman Index	−156.35** (59.43)	−155.29** (59.59)
Constant	822.10* (342.30)	1,123.72** (350.09)

*Significantly different than private insurance, $p < 0.05$.

**Significantly different than private insurance, $p < 0.01$.

***Significantly different than private insurance, $p < 0.001$.

†Marginal effects are linear combinations of the main coefficient for percent uninsured plus the coefficient for the appropriate interaction between percent uninsured and insurance status at the time of the visit.

Figure 1: Marginal Effects of Percent Uninsured in a County on Overall Mean Per-Visit Payment by Insurance Status

those with private insurance coverage. No association was apparent for visits paid for by Medicare and Medicaid or for visits experienced by uninsured individuals. Accounting for differences in the conditions underlying visits using a fixed-effects model did not reduce the association by much, suggesting that unobserved differences in medical severity are unlikely to explain our results. Nevertheless, this study has limitations that preclude a causal interpretation of the results.

One key limitation of this study is that we cannot rule out the possibility that differences in hospital prices across counties are driving both emergency department expenditures and uninsurance rates. Our results, however, are not sensitive to the inclusion or exclusion of the Hospital Wage Index, which is highly correlated with hospital prices. Neither are our results sensitive to the inclusion or exclusion of HHI or the number of emergency physicians per capita, which together should capture differences in the level of competition among hospitals across counties. Still, the extent to which across-county differences in medical prices and hospital market power drive both uninsurance rates and emergency department expenditures cannot be determined using a cross-sectional design, and this constitutes an important limitation of our study.

Table 3: Regression Coefficients (Standard Errors) from Models Predicting Total, Insurance, and Out-of-Pocket Per-Visit Emergency Department Payments

		Source of Payment	
	Total	Insurance	Out of Pocket
Insurance-Specific Marginal Effects of Percent Uninsured [†]			
Private	20.34** (6.66)	16.70** (6.33)	3.64** (1.36)
Medicare	2.64 (7.66)	2.20 (7.55)	0.44 (1.02)
Medicaid	1.39 (3.94)	1.64 (3.83)	−0.24 (0.75)
Uninsured	−7.13 (9.92)	−12.48 (9.36)	5.36 (3.08)
Insurance Status at the Time of Visit (Reference: Privately Insured)			
Medicare	−255.50 (147.25)	−203.54 (143.75)	−51.96** (19.60)
Medicaid	−388.76*** (97.62)	−348.22*** (94.52)	−40.55* (16.02)
Uninsured	22.88 (191.07)	−94.86 (180.69)	117.74* (50.19)
Year of Visit (Reference: 2009)			
2010	23.09 (55.02)	29.75 (54.85)	−6.66 (10.37)
2011	67.22 (48.63)	80.26 (46.91)	−13.04 (8.87)
2012	48.30 (54.95)	26.18 (53.34)	22.12 (12.50)
2013	101.12* (45.28)	91.41* (43.13)	9.71 (11.59)
Visit Category (Reference: “Other”)			
Diagnosis or treatment	136.71 (157.27)	155.60 (158.15)	−18.89 (29.29)
Accident or injury	279.88 (158.79)	280.06 (159.26)	−0.18 (28.88)
Postoperative follow-up	−187.80 (183.37)	−132.32 (188.19)	−55.48 (34.68)
Pregnancy-related	11.99 (266.95)	19.77 (257.60)	−7.78 (45.32)
Sex (reference: female)	72.44 (40.53)	50.52 (39.77)	21.93** (8.02)

Continued

Table 3. *Continued*

	<i>Total</i>	<i>Source of Payment</i>	
		<i>Insurance</i>	<i>Out of Pocket</i>
Age	6.03*** (1.21)	5.54*** (1.18)	0.50* (0.23)
<i>Race and Ethnicity</i>			
Non-Hispanic black	-53.23 (40.16)	-19.03 (38.04)	-34.20** (11.15)
Hispanic, any race	1.84 (53.56)	-2.46 (51.30)	4.30 (15.03)
Non-Hispanic, other race	-53.53 (86.14)	-28.86 (82.55)	-24.67 (17.36)
<i>Household Income Relative to Poverty (Reference: >400%)</i>			
<100%	-296.65*** (61.69)	-256.54*** (58.39)	-40.11* (16.41)
100-125%	-230.25** (74.12)	-185.91** (70.10)	-44.34* (17.25)
125-200%	-247.50*** (64.21)	-214.66*** (61.52)	-32.84* (13.30)
200-400%	-192.57*** (54.16)	-157.93** (51.42)	-34.64** (12.07)
<i>Self-Rated Health (Reference: Excellent)</i>			
Very good	66.40 (50.85)	57.31 (50.34)	9.10 (10.34)
Good	100.60 (51.69)	103.92* (50.66)	-3.32 (10.89)
Fair	161.67** (61.35)	170.16** (58.83)	-8.49 (13.49)
Poor	124.38 (79.84)	138.11 (77.60)	-13.73 (19.35)
<i>County Characteristics</i>			
Percent in poverty	-10.14* (4.57)	-8.71* (4.29)	-1.43 (1.32)
Infant mortality rate	-0.12 (10.94)	3.18 (10.89)	-3.30 (2.72)
Median age	-4.87 (5.01)	-3.21 (4.88)	-1.66 (1.24)
In metropolitan statistical area	3.21 (76.42)	3.82 (71.21)	-0.61 (21.40)
Emergency physicians per capita	-58.22* (27.34)	-52.78* (26.64)	-5.44 (5.73)
Hospital Wage Index	156.02 (125.17)	205.82 (124.48)	-49.80* (21.68)

Continued

Table 3. *Continued*

	<i>Total</i>	<i>Source of Payment</i>	
		<i>Insurance</i>	<i>Out of Pocket</i>
Herfindahl-Hirschman Index	−155.29** (59.59)	−146.98** (55.87)	−8.31 (16.89)
Constant	1,123.72** (350.09)	856.62* (340.93)	267.10** (81.11)

*Significantly different than private insurance, $p < 0.05$.
**Significantly different than private insurance, $p < 0.01$.
***Significantly different than private insurance, $p < 0.001$.
†Marginal effects are linear combinations of the main coefficient for percent uninsured plus the coefficient for the appropriate interaction between percent uninsured and insurance status at the time of the visit.

Another limitation is that, despite the CCS fixed-effects estimation, there still may be unobserved heterogeneity in the severity of emergency department visits that is associated with county uninsurance rates. Our models use a large set of diagnostic codes, 225 in all, which represents ample variance in medical severity, but differences in severity *within* CCS codes may still exist. However, given that the estimates from the fixed-effects model are not much smaller than those from the conventional model, it seems unlikely that unobserved differences in severity could explain a large part of the observed association between county uninsurance rates and per-visit emergency department expenditures. Further, if differences in severity were driving our results, it seems unlikely that the association would emerge for only one insurance group.

Finally, counties are a crude approximation for hospital emergency department markets. Hospital emergency departments likely serve individuals who come from many different counties, which could have very different uninsurance rates. To investigate the sensitivity of our findings to this problem, we estimated our models with variables that operationalize the uninsurance rate at different geographies, including hospital referral regions (HRRs), hospital service area (HSAs), and zip codes. Both HSAs and HRRs are collections of ZIP codes. HSAs are defined by assigning ZIP codes to the hospital area where the greatest proportion of Medicare residents were hospitalized, resulting in 3,436 areas. HRRs were defined by assigning HSAs to the region where the greatest proportion of major cardiovascular procedures were performed, resulting in 306 regions (The Dartmouth Atlas of Health Care 2016). The basic pattern of results we report in this paper is not sensitive to the geographic unit at which the uninsurance rate is operationalized.

These limitations, notwithstanding our results, are consistent with an argument long used to motivate policies aimed at expanding health insurance coverage—that the costs of having a large number of uninsured people might be borne by a substantially wider segment of the population than only those without coverage. To determine whether the relationship between uninsurance rates and the size of the average emergency department payment is causal, future research is needed that replicates our findings with longitudinal data and suitable methods. Insurance coverage expansion under the ACA affords a unique opportunity to do this. As previously uninsured individuals gain coverage under the ACA and as communities experience declines in uninsurance rates, subsequent changes in payments for emergency department visits should be monitored to determine whether the costs associated with high uninsurance rates really do “spillover” to individuals with private health insurance coverage.

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REFERENCES

- Coughlin, T. A., J. Holahan, K. Caswell, and M. McGrath. 2014. “An Estimated \$84.9 Billion in Uncompensated Care Was Provided in 2013; ACA Payment Cuts Could Challenge Providers.” *Health Affairs* 33 (5): 807–14.
- The Dartmouth Atlas of Health Care. 2016. “Research Methods” [accessed on July 14, 2016]. Available at <http://www.dartmouthatlas.org/tools/faq/researchmethods.aspx>
- Frakt, A. B. 2011. “How Much Do Hospitals Cost Shift? A Review of Evidence.” *Milbank Quarterly* 89 (1): 99–130.
- . 2014. “The End of Hospital Cost Shifting and the Quest for Hospital Productivity.” *Health Services Research* 49 (1): 1–10.
- Gresenz, C. R., and J. J. Escarce. 2011. “Spillover Effects of Community Uninsurance on Working-Age Adults and Seniors.” *Medical Care* 49 (9): e14–21.
- Hadley, J., J. Holahan, T. Coughlin, and D. Miller. 2008. “Covering the Uninsured in 2008: Current Costs, Sources of Payment, and Incremental Costs.” *Health Affairs* 27 (5): w399–415.

- Kessler, D. P. 2007. "Cost Shifting in California Hospitals: What Is the Effect on Private Payers?" *Sacramento: California Foundation for Commerce and Education* 7: 1–20.
- Neuhausen, K., A. C. Davis, J. Needleman, R. H. Brook, D. Zingmond, and D. H. Roby. 2014. "Disproportionate-Share Hospital Payment Reductions May Threaten the Financial Stability of Safety-Net Hospitals." *Health Affairs* 33 (6): 988–96.
- Pagan, J. A., L. Balasubramanian, and M. V. Pauly. 2007. "Physicians' Career Satisfaction, Quality of Care and Patients' Trust: The Role of Community Uninsurance." *Health Economics, Policy and Law* 2: 347–62.
- Pagan, J. A., and M. V. Pauly. 2006. "Community-Level Uninsurance and the Unmet Medical Needs of Insured and Uninsured Adults." *Health Services Research* 41 (3pl): 788–803.
- Pagán, J. A., D. A. Asch, C. J. Brown, C. E. Guerra, and K. Armstrong. 2008. "Lack of Community Insurance and Mammography Screening Rates among Insured and Uninsured Women." *Journal of Clinical Oncology* 26 (11): 1865–70.
- Pauly, M. V., and J. A. Pagan. 2007. "Spillovers and Vulnerability: The Case of Community Uninsurance." *Health Affairs* 26 (5): 1304–14.
- Stoll, K., K. Thorpe, R. Pollack, K. Jones, S. Schwartz, and L. Babaeva. 2005. *Paying a Premium: The Added Cost of Care for the Uninsured*. Washington, DC: Families USA.
- Uberoi, N., K. Finegold, and E. Gee. 2016. "Health Insurance Coverage and the Affordable Care Act, 2010–2016." *ASPE Issue*.
- U.S. Centers for Medicare & Medicaid Services. 2014. "The Fee You Pay If You Don't Have Health Coverage" [accessed on July 30, 2014]. Available at <https://www.healthcare.gov/what-if-i-dont-have-health-coverage/>
- White, C. 2013. "Contrary to Cost-Shift Theory, Lower Medicare Hospital Payment Rates for Inpatient Care Lead to Lower Private Payment Rates." *Health Affairs* 32 (5): 935–43.
- Wong, H. S., C. Zhan, and R. Mutter. 2005. "Do Different Measures of Hospital Competition Matter in Empirical Investigations of Hospital Behavior." *Review of Industrial Organization* 26 (1): 27–60.
- Zaman, O. S., L. C. Cummings, and S. Laycox. 2012. "America's Safety Net Hospitals and Health Systems, 2010: Results of the Annual NAPH Hospital Characteristics Survey." *National Association of Public Hospitals and Health Systems*, May.

SUPPORTING INFORMATION

Additional supporting information may be found online in the supporting information tab for this article:

Appendix SA1: Author Matrix.