CENTER FOR INSURANCE POLICY AND RESEARCH

NAIC NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS

2022, ARTICLE 1

The Impact of State Surprise Medical Billing Protections on Consumers with Employer-Sponsored Health Insurance

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JIR40

JOURNAL OF INSURANCE REGULATION 1982–2022

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IMPORTANCE Surprise out-of-network medical billing exposes patients to significant financial risks, undercuts the functioning of the health care markets to set competitive prices, and raises the cost of health care. When this study was conducted, there were no federal protections against surprise medical billing, and states' responses varied. Existing state laws do not apply to people with coverage from self-insured group plans. Consistent with this reality, our study provides empirical evidence that individuals who have employer-sponsored health plans are more likely to have received a surprise out-of-network medical bill if they live in a state taking a comprehensive consumer protection approach than if they live in a state taking no action. We suggest several possible explanations. One is the inability of states to regulate self-insured group plans, highlighting the importance of the federal No Surprises Act.

OBJECTIVES The objective of this research is to examine the relationship between state surprise (balance) billing protections and the incidence of a surprise medical bill among respondents with employer-sponsored health insurance, controlling for other variables that might affect the likelihood of receiving a surprise medical bill, specifically respondents' demographic characteristics and their health insurance literacy.

EVIDENCE We used consumer survey data to investigate the impact of state surprise medical billing protections on consumers with employer-sponsored health insurance. We report responses from 840 survey respondents who indicated they had health insurance through an employer or COBRA.

FINDINGS Our results indicated that consumers with employer-sponsored health insurance who lived in states with comprehensive surprise medical billing protections were more likely to report receiving surprise medical bills than those who lived in states with no protections. We offer several explanations for this result, including that state protections do not apply to self-funded health care plans. We also found that consumers ages 45 to 60 were more likely to have received a surprise medical bill, which is consistent with the age distribution of those receiving the highest proportion of medical procedures.

CONCLUSION & RELEVANCE Our study contributes to the health insurance literature by deepening our understanding of surprise medical billing regarding both consumer knowledge and the impact of state regulation. We believe we are the first to model the relationship between state surprise billing protections and the incidence of surprise medical billing. Our empirical finding regarding the significance of age is

consistent with the age group distribution of those most likely to have surgical and non-surgical procedures. The robustness checks provide evidence that the contractual relationships among insurers and hospitals are one source of surprise medical billing. Our study provides evidence that self-insured group health plans may be another source of surprise medical billing. Given the No Surprises Act is now in effect, we offer recommendations for state insurance regulators regarding implementation of the new legislation.

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ABSTRACT

This article used consumer survey data to investigate the impact of state surprise medical billing protections on consumers with employer-sponsored health insurance. State protections were categorized as comprehensive, partial, and none following the Commonwealth Fund (2019). Our results indicated that consumers with employer-sponsored health insurance who lived in states with comprehensive surprise medical billing protections were more likely to report receiving surprise medical bills than those who lived in states with no protections. We offer several explanations for this result, including that state protections do not apply to self-funded health care plans. Regarding differences across ages, we found that consumers ages 45 to 60 were more likely to receive a surprise medical bill, which is consistent with the age distribution of those receiving the highest proportion of surgical and non-surgical procedures. With these results, our study contributes to the health insurance literature by deepening our understanding of surprise medical billing regarding both consumer knowledge and the impact of state regulation.

1. Introduction

Surprise out-of-network medical bills (e.g., Americans hit with $12,000 in surprise emergency room bills and $600 in Band-Aids [Kliff, 2017]; a $17,850 surprise out-of-network bill for a urine test at an in-network doctor's office [Rosen, 2019]) have captured the attention of both state and federal regulators. In December 2020, the U.S. Congress (Congress) enacted a $900 billion COVID-19 relief package and government funding bill (H.R. 133). Included in the measure was the federal No Surprises Act (NSA) (H.R. 133, P.L. 116-260), federal legislation designed to end the most common types of surprise out-of-network billing. Starting Jan. 1, 2022, both providers and health plans must treat many out-of-network services as if they are in-network when calculating patient cost-sharing, with the notable exception of ground transportation. This new federal surprise billing protection applies to all commercially insured patients, including, for the first time, those in self-insured group health plans. The federal law also extends to out-of-network care provided by air ambulance providers and post-stabilization services.

Prior to the federal legislation, consumers in more than half of the states were protected against surprise medical bills by some form of legislation. A key difference between state protections and the recently enacted federal legislation is that the federal law protects patients covered by employer-sponsored health plans. Thus, the goal of this research is to examine the relationship between state surprise (balance) billing protections[1]—categorized in this research as comprehensive, partial, or none—and the incidence of a surprise medical bill among respondents with employer-sponsored health insurance, controlling for other variables that might affect the likelihood of receiving a surprise medical bill, specifically respondents' demographic characteristics and their health insurance literacy. We used data from the Consumer Health Insurance Knowledge and Experience Survey fielded in July 2020 by the Center for Insurance Policy and Research (CIPR) of the National Association of Insurance Commissioners (NAIC). We also conducted a series of robustness checks to validate our main findings by adding new control variables that measure characteristics of a state's health care structure. The intent of the robustness checks was to control for the contractual relationships among insurers, physicians, and hospitals that may influence whether patients encounter out-of-network providers at in-network hospitals.

We find that consumers with employer-sponsored health plans in states with comprehensive surprise billing protections are more likely to receive a surprise medical bill than those in states that have no surprise billing protection law at all, holding all else constant. While this result may seem contrary to what might be expected, we believe there are several plausible explanations. One such explanation is that consumers in states with comprehensive protections are more likely to receive surprise medical bills, which may have been the motivation for the legislation. Another possible explanation

1. Technically, these protections are often referred to as "balance billing" protections. The Commonwealth Fund's definition of balance billing is: "1) when an enrollee receives emergency care either at an out-of-network facility or from an out-of-network provider, or 2) when an enrollee receives elective nonemergency care at an in-network facility but is inadvertently treated by an out-of-network health care provider" (Kona, 2021). As this definition is consistent with our definition of surprise billing, we use the latter term in this article, as that is the term we used in the survey.

is the likelihood that many of our respondents were in self-funded plans to which state protections do not apply.

In addition, we find that participants ages 45 to 60 are more likely to receive a surprise bill than those ages 18 to 29. This is consistent with a federal Centers for Disease Control and Prevention (CDC) study (Hall et al., 2017) in which patients ages 45 to 64 received the highest proportion (39%) of any age group of the 48.3 million surgical and non-surgical procedures performed during ambulatory surgery visits to hospitals and ambulatory surgery centers in 2010. Thus, patients ages 45 to 64 have a greater opportunity to encounter surprise medical billing than those who are in other age groups.

Finally, the robustness checks provide state-level evidence that the number of non-federal, short-term, acute care hospitals in a state is positively associated with the incidence of out-of-network surprise bills. As hospitals and physicians contract independently with insurance companies, more hospitals increase the odds that a patient will encounter out-of-network care.

Ultimately, this paper makes five contributions to the literature. First, to the best of our knowledge, we are the first to model the relationship between state surprise billing protections and the incidence of surprise medical billing. Second, our empirical finding regarding the significance of age is consistent with the age group distribution of recipients of surgical and non-surgical procedures, and to our knowledge, we are the first to identify this relationship in empirical research. Third, the robustness checks provide empirical evidence that the contractual relationships among insurers and hospitals are one source of surprise medical billing. Fourth, our study provides empirical evidence that self-insured group health plans may be another source of surprise medical billing. Finally, given that the No Surprises Act is now in effect, we also offer some recommendations for state insurance regulators regarding implementation of the new legislation.

Going forward, this paper is structured as follows. Section 2 gives a literature review related to the primary variables in our model. Section 3 explains state surprise billing protections. We describe our data and analytic approach in Section 4. In Section 5, we discuss the results of our empirical model and the results of the robustness check. Section 6 discusses the No Surprises Act and makes recommendations for state insurance regulators. Section 7 concludes the work.

2. Literature Review

2.1 Surprise Medical Billing and Relevant State Legislation

The United States has made significant progress on health insurance coverage since the federal Affordable Care Act (ACA) came into effect in 2010, with an estimated 20 million fewer uninsured (Collins et al., 2017). However, even insured consumers can encounter substantial health care costs, especially when an out-of-network provider treats them. The patient's share of the cost of out-of-network medical care (in the form of a deductible, coinsurance, copayment, or balance bill) is commonly referred to as surprise medical billing. Surprise medical bills are a major source of financial hardships for patients (Cooper & Scott Morton, 2016). According to a Kaiser Family

Foundation (KFF) survey, a third of the large troubling medical bills received by insured, working-age adults are charges from out-of-network providers (Hamel et al., 2016).

Surprise medical bills typically arise when an out-of-network provider treats a patient. This often happens in an emergency when the patient has no role in choosing the health care facility or providers. Or a patient may receive care at an in-network facility from an out-of-network provider (e.g., physicians who provide surgical-related services, such as anesthesiologists, radiologists, pathologists, and assistant surgeons). Physicians and hospitals independently negotiate contracts—i.e., payment terms, network participation agreements, etc.—with insurers; thus, physicians and the hospitals where they work may not contract with the same insurance company.

There are three possible outcomes when an insured patient receives an out-of-network medical bill depending on how their insurance company handles it. First, the insurer may cover the out-of-network bill in full. However, the patient may still be responsible for coinsurance, which may be substantial when a patient has seen an out-of-network provider. This likely creates a financial hardship for many; a recent Federal Reserve report found that 37% of adult Americans could not cover an unexpected $400 expense without borrowing or selling assets (Board of Governors of the Federal Reserve System, 2020). A second possible outcome when a patient receives an out-of-network medical bill is that the insurer may partially cover the cost of the out-of-network care; the amount covered is usually based on the average charges for that service (Cooper et al., 2018). Because there is no network contract between the provider and the insurer, the provider can bill the patient for the difference between the insurer's payment and the full charge. Thus, the patient can be liable for the balance; this practice is typically referred to as "balance billing." In a third possible outcome, when a patient uses an out-of-network provider, the insurer may not pay any of the out-of-network medical bill, leaving the patient responsible for the entire bill, which can amount to thousands of dollars. According to a Federal Reserve report, more than 20% of adult Americans had major unexpected medical bills in 2019, with median expenses between $1,000 and $1,999 (Board of Governors of the Federal Reserve System, 2020).

Data about the prevalence of surprise medical bills and costs to consumers are limited. According to Cooper et al. (2018), there has been no systematic examination of the frequency with which out-of-network surprise billing occurs. A 2015 survey by the Kaiser Family Foundation reported that charges from out-of-network providers account for a third of medical bill problems among insured, non-elderly adult Americans (Hamel et al., 2016). In the survey, the authors also found that bills from emergency medicine physicians made up the largest share of medical debt that patients struggle to repay. A more recent survey found that more than 40% of the consumers surveyed received a surprise medical bill, with half of those reporting that the bill was more than $1,000 (Families USA, 2019). Another Kaiser Family Foundation survey found that surprise bills are the most-cited concern related to health care costs and other household expenses among insured working-age adults, with two-thirds saying they were "very worried" or "somewhat worried" about being able to afford a surprise medical bill if they or a family member received one (Kirzinger et al., 2018).

Evidence from recent empirical studies confirms the results of these surveys. Chhabra et al. (2020) evaluated out-of-network billing among privately insured patients who had undergone one of the seven common elective surgeries with in-network primary surgeons at in-network facilities. The researchers used claims data from a large U.S. commercial insurer. They found that more than 20% of the patients received a surprise bill, and the mean balance of these bills was more than $2,000. Biener et al. (2021) used data from the Medical Expenditure Panel Survey and found that an out-of-network bill for emergency medicine physicians was 10 times what other emergency medicine physicians were paid.

To examine the impact of a New York law that introduced binding arbitration between emergency physicians and insurers, which weakens physicians' negotiating power to stay out-of-network and charge higher prices without losing patients,[2] Cooper et al. (2018) used data from a large insurer. The researchers reported that after the New York law went into effect, out-of-network billing was lower by 34%, and in-network emergency medicine physician payments were lower by 9%. In a retrospective study of anesthesiology claims in three states with surprise billing legislation, La Forgia et al. (2021) reported decreases in both in-network and out-of-network anesthesiology prices after the legislation. This is despite the fact that each state took a different approach to establish a payment method.

2.2. Control Variables

Our analysis controlled for two types of variables that may influence the incidence of surprise medical billing. One type of variable is the respondents' health insurance literacy. The second is the respondents' demographic characteristics.

A commonly used definition of health insurance literacy is "the degree to which individuals have the knowledge, ability, and confidence to find and evaluate information about health plans, select the best plan for their own (or their family's) financial and health circumstances, and use the plan once enrolled" (Quincy, 2012, p. ii). While there is no one accepted way to measure health insurance literacy, we found three approaches in the literature. One approach uses an established measure, such as the Health Insurance Literacy Measure (HILM) (Paez et al., 2014), which assesses confidence in choosing and using health insurance, as well as behaviors when choosing and using health insurance (O'Connor & Kabadayi, 2020). Several researchers, including Tipirneni et al. (2018), Call et al. (2021), McLeod and Adepoju (2018), and Adepoju et al. (2019), have used the HILM to measure health insurance literacy.

A second approach is to require respondents to demonstrate knowledge about health insurance in scenarios. For example, McCormack et al. (2009) assessed health insurance literacy by asking respondents to interpret actual Medicare documents.

A third approach, and the one used in this study, is to objectively measure consumer knowledge using multiple choice and/or true false questions, similar to Lusardi and

2. Traditionally, physicians face a price-volume trade-off when they decide whether to join a network, as many patients will not seek treatment from an out-of-network physician. However, physicians in high demand can command high prices if they join a network and will not lose patient volume even if the negotiation fails due to inelastic demand. Such physicians include emergency department physicians, radiologists, and pathologists, as they are part of the wider bundle of hospital care and cannot be avoided once a hospital choice is made.

Mitchell's (2014) widely-used Big 3 and Big 5 financial literacy questions. Tennyson (2011) used this approach to measure insurance literacy broadly. Norton et al. (2014), Villagra et al. (2019), and Loewenstein et al. (2013) all measured health insurance literacy as knowledge. Loewenstein et al. (2013) used four items to measure health insurance literacy; i.e., deductibles, copays, coinsurance, and out-of-pocket maximums. Our research also used four items; i.e., one about deductibles one about copays, and two about coverage required in ACA health plans.

The second type of control variable included in this research is demographic characteristics. Previous research has identified several characteristics relevant to consumer knowledge about the use of health insurance. Across the studies reviewed, demographic characteristics frequently included in multiple regression analyses were age, gender, income, and education (Adepoju et al., 2019; Call et al., 2021; O'Connor & Kabadayi, 2020; Tipirneni et al., 2018). Call et al. (2021) noted that characteristics that generally disadvantage consumers, such as lower incomes and education, can create systemic biases that reduce trust in and use of health care systems. Less exposure to health care systems may lead to less knowledge of health insurance. Other researchers, including Tipirneni et al. (2018), added geographic location and insurance status in their analyses.

2.3 Robustness Check Variables – Contracting Frictions among Hospitals, Physicians, and Insurers

According to Cooper et al. (2018),[3] there are approximately 54,000 emergency medicine physicians, 5,500 hospitals, and more than 1,000 insurers in the United States. As a result, it is unlikely that any given emergency medicine physician, whom a patient seeking emergency care does not choose and cannot avoid, will have contracted with any given patient's insurer.

Researchers have examined the influence of various aspects of contractual relationships on surprise medical billing. Bai and Anderson (2016) used nationally representative hospital data from Medicare and found that physicians that typically are not chosen by patients (e.g., anesthesiologists, emergency medicine physicians, radiologists) have the highest charges, as measured by the percentage of Medicare allowable amounts.[4] According to a Texas Center for Public Policy Priorities (CPPP) study (Pogue & Randall, 2014), between 21% and 56% of the hospitals that contracted with the largest three insurers in Texas had no in-network emergency medicine physicians.

Cooper et al. (2020) used 2015 claims data from a large commercial insurer and found that out-of-network billing is more prevalent at hospitals in concentrated hospital and insurance markets and for-profit hospitals. If the providers in their study had been prohibited from billing out-of-network, physician payments for privately insured patients would have been lower by 13.4%. Health care spending for people

3. Adams (2021) described criticism of this report based on information that UnitedHealthcare worked behind the scenes to shape the narrative framing of the study report, although not the data or the actual results.

4. Medicare allowable amounts, or what is also known as the Medicare physician fee schedule, is a system that predetermines for a specific medical procedure or service how much providers are allowed to charge Medicare patients and how much they will be reimbursed. More information can be found at the CMS fee schedule website: *https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/FeeScheduleGenInfo*

with employer-sponsored insurance (ESI) would have been lower by 3.4%. Together, these two reductions would have amounted to savings of approximately $40 billion annually.

3. State Surprise Billing Protections

State action to protect consumers from surprise medical bills focuses on setting requirements for state-regulated health plans and providers. A 2017 study by the Commonwealth Fund (Lucia et al., 2017) reported that 21 states had laws that offer at least some protections for consumers related to surprise medical billing. By January 2020, seven months before our survey was conducted, the number of states with laws offering some surprise billing protection had increased to 29, and of those, 14 states—California, Colorado, Connecticut, Florida, Illinois, Maine, Maryland, New Hampshire, New Jersey, New Mexico, New York, Oregon, Texas, and Washington—offered comprehensive protections (Commonwealth Fund, 2020).[5]

The Commonwealth Fund's (2019) criteria for a state's surprise billing protections to be considered "comprehensive" are listed below:

1. Applies to both emergency services and nonemergency care provided in a network facility.
2. Applies to all types of managed care plans, including both Health Maintenance Organizations (HMOs) and Preferred Provider Organizations (PPOs).
3. Holds the patient harmless for both the portion of out-of-network claims that is beyond in-network level cost-sharing and balance billing from providers; the out-of-network provider is prohibited from collecting any amount beyond in-network level cost-sharing from patients.
4. Regardless of the resolution of the payment, a state must either have a payment standard—i.e., a rule to determine how much the insurer pays the provider—or a dispute resolution process to resolve payment disputes between insurers and providers.

Another 15 states have enacted protections that do not meet all the critical elements listed above; the Commonwealth Fund describes those states' protections as partial. These 15 states are Arizona, Delaware, Indiana, Iowa, Massachusetts, Minnesota, Mississippi, Missouri, Nebraska, Nevada, North Carolina, Pennsylvania, Rhode Island, Vermont, and West Virginia. The remaining 21 states and the District of Columbia had no surprise billing protections as of January 2020. Each state's surprise billing protection approach as of January 2020 is listed in Appendix Table 1A.

Regardless of the specific state approach regarding surprise billing, all states have limited jurisdiction to protect consumers covered by employer-sponsored self-insured (or self-funded) health plans due to the federal Employee Retirement Income Security Act of 1974 (ERISA). ERISA prevents states from direct regulation of self-insured group health plans. Thus, states cannot require these plans to cover out-of-network surprise bills, apply in-network cost-sharing to out-of-network surprise bills, or settle payment

5. Three states—Georgia, Michigan, and Virginia—subsequently passed legislation that the Commonwealth Fund categorized as comprehensive.

disputes with an out-of-network provider using state-established payment rules or procedures. It also is worth noting that at the time this study was conducted, four states—Maine, New Jersey, Nevada, and Washington—permitted self-insured group health plans to opt in to state-level surprise medical billing protection laws (Keith et al., 2021).

According to a Kaiser Family Foundation (2018) study, 61% of covered workers have insurance through a self-insured group health plan. We do not know which of our respondents who reported coverage through an employer-sponsored health plan were in self-insured plans, nor do we believe many respondents would have known if we had asked that question. Thus, our study's estimates of the likelihood of the incidence of surprise medical bills most probably include respondents for whom state surprise billing protections do not apply. Consequently, we expect a limited effect of state regulation on the surprise billing experiences of consumers covered by employer-sponsored health plans.

4. Data and Methodology

4.1. Data

Our data came from the Consumer Health Insurance Knowledge and Experience Survey, or Health Knowledge Survey hereafter, conducted by the NAIC's CIPR. The 39-question survey explored knowledge and experiences related to health insurance. The survey was fielded July 8–9, 2020; 2,068 participants (ages 18 and older, located in the United States) were recruited through SurveyMonkey's Audience Panel, a "diverse online population" that has volunteered to take surveys.[6] A total of 1,505 respondents provided complete responses for the variables of interest in this study.

The survey included a question that directly asked respondents if they or a family member had ever experienced a surprise *out-of-network* bill. The specificity of the question turned out to be important, because as will be reported later, respondents were first asked a multiple-choice question about the definition of surprise billing, and they had varying interpretations of the term. Only 22% of the respondents correctly chose "A bill for the charges when you use a provider who is outside your health insurance network, even if you didn't choose the outside provider" as the definition of a surprise medical bill.[7] Thus, defining the term and specifying that our questions were about their experiences with surprise out-of-network bills was important.

Other survey questions relevant to this study asked respondents about the type of health insurance they have and four health insurance literacy questions, as well as their age, gender, household income, and employment status. Respondents also provided the zip code of their residence, which was used to determine the state of residency.

The average time to complete the survey was 4 minutes, 30 seconds. The project received Human Subject approval from IntegReview. Respondents were financially

6. *https://help.surveymonkey.com/articles/en_US/kb/SurveyMonkey-Audience#Panel*

7. Other response choices were: 1) A bill for charges you think your insurance company has already paid (25%); 2) A bill for services or medications that you don't think you ever received (15%); and 3) A bill for services or medications that the insurance company said it would pay but now it won't (38%).

compensated by SurveyMonkey. SurveyMonkey calculated a margin of sampling error on the total results as +/- 2.229 percentage points.

In this study, we report responses only from the 840 respondents who indicated that they had health insurance through an employer (employer-sponsored insurance) or Consolidated Omnibus Budget Reconciliation Act of 1986 [COBRA]).[8] We excluded the 450 respondents with Medicare, Medicaid, or military or veteran's coverage, as these programs generally limit patient exposure to surprise billing. We also excluded respondents who indicated that they purchased private insurance, because there were only 100 in the sample, as well as those who said they had no health insurance coverage (70). A logistic regression using the full (1,505) sample supports this decision. With the source of insurance as the only variable in the regression, the Medicare/Medicaid/Military group and those with private health insurance were significantly less likely to report the receipt of surprise bills than the omitted/reference category; i.e., ESI/COBRA (see Appendix Table 4A).

4.2 Descriptive Statistics

Table 1 provides summary statistics for all the questions used in this study for both the 1,505 who provided complete responses for the variables of interest and the 840 observations in the final cross-sectional employer-sponsored/COBRA-insured subsample. The primary differences between the full sample and the subsample reflect the restriction of the subsample to those covered by employer-sponsored health insurance. Relative to the full sample, the subsample was younger, had higher incomes, and were more likely to be employed.

Looking specifically at the subsample (Columns 2 and 4 of Table 1), at least 70% of respondents chose the correct responses to each of the four health insurance literacy questions. Only 20% correctly defined the term "surprise medical bill." About 40% of the respondents or their family members in the subsample (37% in the larger sample) had received a surprise out-of-network medical bill; recall that we gave the correct definition to respondents immediately before they answered this question. In our data, about 49% of respondents lived in states with comprehensive surprise billing protection; 20% were residents in states with limited protection, and 30% of the respondents were in states with no surprise billing protection.

Approximately 52% of respondents in the subsample were ages 18 to 44. Another 38% were ages 45 to 60, and 9.5% were older than 60. Slightly more than half of the respondents were women (52%). About 28% of the respondents' households earned less than $50,000 a year; 45% earned between $50,000 and $99,999 annually, which was the highest proportion among all income groups. About 72.5% of the respondents in the subsample were employed and worked full-time; the second highest proportion (11.6%) were employed and worked part-time.

8. COBRA is a law mandating an insurance program, which gives some employees the ability to continue health insurance coverage after leaving employment by paying both their share and the employer's share of the insurance premium.

Table 1: Summary Statistics for Survey Responses

Variables	N = 1,505		N = 840	
	(1) n	(2) Percent	(3) n	(4) Percent
Have you or a family member ever received a surprise out-of-network medical bill?				
Yes	563	37.41	336	40.00
No	702	46.64	375	44.64
Unsure	240	15.95	129	15.36
How would you define health insurance deductible?				
The amount you have to pay for your covered health care before your health insurance policy starts to pay for medical services	1,122	74.55	640	76.19
The amount the insurance company subtracts from the total bill	157	10.43	87	10.36
The amount subtracted from your paycheck each month to pay for your policy	126	8.37	80	9.52
I don't know	100	6.64	33	3.93
How do you define copay?				
A fixed amount that you pay each time you use most covered medical services	1,125	74.75	667	79.40
The amount of your medical bill that you pay after discounts are applied.	234	15.55	111	13.21
The part of your medical bill your insurer pays	86	5.71	43	5.12
Don't know	60	3.99	19	2.26
Regular health insurance/ comprehensive policies must cover pre-existing conditions (health problems that you had before your coverage started, like asthma, diabetes, or cancer)				
True (Correct)	1,097	72.89	605	72.02
False (Incorrect)	408	27.11	235	27.98
Regular health insurance/ comprehensive policies must cover preventive care, such as wellness visits or vaccinations				
True (Correct)	1,169	77.67	667	79.40
False (Incorrect)	336	22.33	173	20.60
How would you define a "surprise medical bill?"				
A bill for the charges when you use a provider who is outside your health insurance network, even if you didn't choose the outside	319	21.20	165	19.64
A bill for charges you think your insurance company has already paid	396	26.31	235	27.98
A bill for services or medications that you don't think you ever received	204	13.55	100	11.90
A bill for services or medications that the insurance company said it would pay but now it won't	586	38.94	340	40.48
Type of surprise billing protections in respondents' states				
Comprehensive	737	48.97	408	48.57

Partial	313	20.80	172	20.48
None	455	30.23	260	30.95
What is your primary source of health insurance?				
Employer-sponsored/COBRA	840	55.82	840	100.00
Medicare/Medicaid/Military	450	29.91		
Private insurance	100	6.64		
No insurance	70	4.65		
Other	45	2.99		
Age				
18–29	318	21.13	197	23.45
30–44	347	23.06	241	28.69
45–60	511	33.95	322	38.33
>60	329	21.86	80	9.52
Gender				
Male	696	46.25	404	48.10
Female	809	53.75	436	51.90
Household Income				
$0–$49,999	624	41.46	236	28.10
$50,000–$99,999	557	37.01	380	45.24
$100,000–$149,999	206	13.69	142	16.90
$150,000+	118	7.84	82	9.76
Employment Status				
Employed, working full-time	743	49.37	609	72.50
Disabled, not able to work	90	5.98	8	0.95
Not employed, NOT looking for work	112	7.44	55	6.55
Not employed, looking for work	122	8.11	44	5.24
Employed, working part-time	228	15.15	97	11.55
Retired	210	13.95	27	3.21

4.3 Construction of Respondents' Health Insurance Literacy Indices

We constructed health insurance literacy measures from the four health insurance knowledge questions in the survey. First, we created an overall health insurance literacy index by aggregating the coded values (1 for a correct answer and 0 for an incorrect or don't know response) for the four knowledge questions for each respondent. However, the Cronbach's alpha, a measure of the internal reliability of the index, was 0.33, far below the commonly accepted rule of greater than 0.7 (Adeniran, 2019).[9] We then conducted a factor analysis, as the Bartlett test result indicated that sufficient intercorrelation existed. The factor analysis results suggested two factors; i.e., one about knowledge of deductibles and copays and a second about knowledge of ACA health plan coverage. Thus, we created two health insurance literacy indices, each with scores ranging from 0 to 2. A score of 0 indicated that the respondent answered

9. The Cronbach's alpha was even lower, at 0.2895, when we included the definition of surprise medical billing variable in a five-item health insurance literacy index.

both questions incorrectly, 1 meant the respondent answered one question correctly, and 2 meant the respondent answered both questions correctly.

As shown in Table 2, in both indices, at least 60% (65% in Index 1 and 61% in Index 2) of the respondents in the subsample answered both questions correctly, while about 10% did not answer either question correctly. (Respondents in the full sample did slightly worse than those on the subsample on index 1 but not on index 2.) We treated knowledge of the definition of surprise medical billing as a third measure of health insurance knowledge; as noted above, about 20% chose the correct response.

Table 2: Health Insurance Literacy Constructs

Variables	N = 1,505		N = 840	
	n	Percent	n	Percent
Health Insurance Literacy Index 1				
2	928	61.66	547	65.12
1	391	25.98	213	25.36
0	186	12.36	80	9.52
Health Insurance Literacy Index 2				
2	928	61.66	517	61.55
1	410	27.24	238	28.33
0	167	11.10	85	10.12

4.4. Empirical Model

Following Peng et al. (2002), we used logistic regression to analyze the data. Logistic regression is commonly used to describe and test the relationships between a categorical outcome variable and one or more categorical or continuous predictor variables. In this study, we sought to test the relationship between the likelihood of having received a surprise medical bill and state surprise billing protections, controlling for health insurance literacy measures and demographic characteristics. Specifically, the regression model had the following form:

$$logit(Received\_SMB) = \ln\left(\frac{\pi}{1-\pi}\right) = \alpha + \beta_1 StateProtection + \beta_2 SMBdef + \beta_{3\text{-}4} HIL(s) + \beta^T D \quad (1)$$

where *Received_SMB* is a binary variable describing a respondent's experience with a surprise out-of-network medical bill, coded 1 for having received a surprise medical bill, and 0 for no or not sure.

The key variable of interest is the state surprise billing protection, *StateProtection*. This variable is a categorical variable; using the Commonwealth Fund's (2020)

definitions, no protection, limited protection, and comprehensive protection were the categories.

SMBdef is one of three measures of health insurance literacy. One of the three measures is a binary variable describing a respondent's knowledge of the definition of surprise medical bill, coded 1 if the respondent selected the correct answer and 0 otherwise. *HIL(s)* are the two health insurance literacy measures based on the four health insurance knowledge questions in the survey. *D* represents the vector of measures of the demographic characteristics age, gender, household income, and employment status.

Taking the antilog of Equation (1) on both sides, we derived the equation to predict the probability of having received a surprise medical bill, therefore:

$$\pi = Probability(Received\_SMB = 1 \mid StateProtection, SMBdef, HIL(s), D)$$

$$= \frac{e^{\alpha + \beta_1 StateProtection + \beta_2 SMBdef + \beta_3 HIL(s) + \beta^T D}}{1 + e^{\alpha + \beta_1 StateProtection + \beta_2 SMBdef + \beta_3 HIL(s) + \beta^T D}} \qquad (2)$$

Regarding the validity of the empirical model, we conducted the following assessments: 1) link test for model specification error check; 2) Box-Tidwell for best predictor power transformation; 3) Hosmer-Lemeshow's goodness of fit statistics; 4) multicollinearity test; and 5) influential observation statistics. The results indicated that the logistic regression model was appropriate. The independent variables were measured without error, as the Box-Tidwell test showed the best power transformation for independent variables (all are 0). The Hosmer-Lemeshow's test showed a good fit of the model, as the predicted frequency and the observed frequency matched well. For the multicollinearity test, the Variance Inflation Factor (VIF) score for each variable was well below the suggested threshold of 10, indicating that multicollinearity was not an issue. The influential observation statistics showed there were no potential observations that had a significant impact on the model.

After estimating the logistic regression, we then used the estimated coefficients to calculate the average predicted probability of having received a surprise medical bill. Then we conducted robustness checks by supplementing the logistic regression, with added variables to control for the health care structure in each state.

5. Results

5.1. Empirical Results

Table 3 presents the coefficients (Column 1) from the logistic regression. Column 2 reports the odds ratios from the estimation of Equation 1; the relationship between the included explanatory variables (state surprise billing protections and other control variables); and the likelihood that the respondents, who had health insurance through employment, had received a surprise out-of-network medical bill. For each independent variable, the regression coefficient is the predicted change in the log odds of being in the target group for each non-reference group of an independent variable

compared to the reference group for this independent variable, controlling for the remaining variables; the odds ratio quantifies the predicted change. The odds ratio is greater than 1 if the estimated coefficient is positive; if the odds ratio is less than 1, the estimated coefficient is negative. The target group is those who have received a surprise out-of-network medical bill; the reference group is those who have not received a surprise out-of-network bill or were not sure.

Table 3: Logistic Regression Results for Employer-Sponsored Insurance and COBRA Covered Respondents' Experience with Surprise Medical Billing

	Have you or a family member ever received a surprise out-of-network medical bill?	
	(1)	(2)
Variables	Coefficient	Odds Ratio
State Surprise Billing Protections (Reference group = No protection)		
Limited Protection	-0.1198	0.8871
	(0.2101)	(0.1864)
Comprehensive Protection	0.3679**	1.4447**
	(0.1704)	(0.2461)
Definition of a "surprise medical bill?" (Reference group = Incorrect or don't know response)		
Bill for services from out-of-network provider	0.7823***	2.1865***
	(0.1848)	(0.4041)
Health Insurance Literacy Index 1 (Reference group = 0)		
1	-0.0549	0.9466
	(0.2881)	(0.2727)
2	0.0904	1.0946
	(0.2716)	(0.2973)
Health Insurance Literacy Index 2 (Reference group = 0)		
1	-0.1234	0.8839
	(0.2663)	(0.2354)
2	-0.1391	0.8701
	(0.2495)	(0.2170)
Age (Reference group = Ages 18–29)		
30–44	0.2761	1.3180
	(0.2171)	(0.2862)
45–60	0.4099**	1.5066**
	(0.2085)	(0.3142)
>60	-0.0015	0.9985
	(0.2967)	(0.2963)

Gender (Reference group = Male)		
Female	0.1402	1.1505
	(0.1531)	(0.1761)
Household Income (Reference group = $0–$49,999)		
$50,000–$99,999	-0.0820	0.9212
	(0.1834)	(0.1689)
$100,000–$149,999	0.1226	1.1304
	(0.2295)	(0.2594)
$150,000+	-0.1844	0.8316
	(0.2823)	(0.2347)
Employment Status (Reference group = Employed, working full-time)		
Disabled, not able to work	-0.8332	0.4347
	(0.7400)	(0.3216)
Not employed, NOT looking for work	-0.4199	0.6571
	(0.3137)	(0.2061)
Not employed, looking for work	-0.1157	0.8907
	(0.3546)	(0.3159)
Employed, working part-time	-0.0713	0.9312
	(0.2424)	(0.2257)
Retired	0.3068	1.3591
	(0.4211)	(0.5723)
Constant	-0.8892**	0.4110**
	(0.3588)	(0.1475)
Observations	840	840
Pseudo R^2	0.0351	0.0351

NOTE: Robust Standard Errors in parentheses; asterisk denotes significance levels with *** p<0.01, ** p<0.05, * p<0.1

Our estimation results show that comprehensive state-based consumer protection is a positive and significant predictor of receipt of a surprise medical bill. Respondents with employer-sponsored health plans who live in states that have taken a comprehensive approach to surprise billing protection were 1.4 times more likely to report having received a surprise out-of-network medical bill than respondents who live in states that had no out-of-network state-based surprise billing protections.

An analysis was conducted to investigate whether the State Protection Approach variable was endogenous. In the test, three state-level health care structure measures—number of hospitals per 50 square miles, emergency department physician ratio to the total number of physicians, and the number of health insurers in the state—were used as instruments for the State Protection Approach variables in an extended ordered probit model (see Section 5.2 for a more complete explanation of these variables). The test results, which are reported in the Appendix Table 5A, indicated that the State Protection Approach variable was not endogenous for the subsample of respondents covered by employer-sponsored insurance.

There are at least three possible explanations for the seemingly unexpected result that consumers encountered *more* surprise medical billing in states that have taken a comprehensive approach to protect consumers. One possible explanation is that surprise medical billing happens more often in these states. A higher incidence of surprise billing may explain why a state implemented more stringent legislation. Another possible explanation is that consumers in states with comprehensive protections, compared to those in states with no protections, have greater awareness of surprise out-of-network medical bills and are more likely to recognize when they receive one. We do not have the data to test either explanation.[10]

Another possible explanation is that a substantial number of respondents were in self-insured group health plans to which state protections did not apply. According to the Kaiser Family Foundation (2018), 61% of covered workers and 81% of workers in large firms are covered by this type of plan. Pollitz et al. (2020) also reported that their estimates of surprise medical bills were substantially influenced by plans that were not subject to state laws. To test this idea, we ran a separate regression grouping the four states that allow self-funded group health plans to opt in to state-level surprise billing protections as one type of state surprise billing protection approach. The four states were Nevada from the limited protection state group and Maine, New Jersey, and Washington from the comprehensive protection state group. The results (reported in Appendix Table 3A) appear to support the idea that self-funded group health plans are one source of surprise medical bills. The coefficient for the four states that allow self-funded plans to opt in (most of these plans chose to opt in) also was positive though not significant; however, there were only 53 observations.[11] The coefficient for states in the limited protection group was negative but not significant, while the coefficient for states following the comprehensive protection approach remained positive and significant.

Neither of the health insurance literacy indices were significant predictors of the likelihood of reporting receipt of an out-of-network surprise bill. Perhaps the index was too limited in its measure of health insurance literacy.[12] Or, perhaps health insurance literacy was not an important influence because, as noted earlier, surprise medical billing usually occurs in situations in which the patient has no control. However, respondents who chose the correct definition of a surprise medical bill were more likely to have

10. At a reviewer's suggestion, we conducted Chi-Square tests for Definition of Surprise Billing and Health Insurance Literacy variables and found that the variables were independent except in the ESI/COBRA sample and then only for knowledge of the ACA (see Health Insurance Literacy Index 2). We also conducted Chi-Square tests for the Definition of Surprise Billing and State Protection Approach variables; the test indicated that the variables were independent for both the full sample and the subsample.

11. Following the usual rule of thumb for the minimum number of observations in logistic regression of 10 observations per independent variable for a univariate regression, we needed at least 60 observations, as we have six variables. However, in one study (Vittinghoff & McCulloch, 2007), the authors relaxed the rule of 10 events per variable and found that model performance, such as coverage and bias, was in acceptable intervals.

12. As noted earlier, to construct the health insurance literacy indices, we first tried using all five of the items that measured knowledge; i.e., the surprise billing definition question and the other four questions used to create the health insurance literacy indices. However, the Cronbach's alpha and factor analysis indicated insufficient intercorrelation between the surprise billing definition and the other four questions to use them to create one index of knowledge. A reviewer suggested that awareness of surprise billing might be driving the results. To examine that possibility, we conducted a Chi-Square test of the relationship between Definition of Surprise Billing and Health Insurance Literacy. We found that the variables were independent except in the ESI/COBRA sample and then only for knowledge of the ACA (see Health Insurance Literacy Index 2).

experienced an out-of-network surprise bill compared with those who chose a wrong answer, suggesting awareness and knowledge are related.[13,14]

Among the demographic characteristics, only age was significant. Relative to those ages 18 to 29, respondents who were ages 45 to 60 were 1.5 times more likely to have experienced a surprise out-of-network medical bill.

Table 4 shows the average predicted probability of having received a surprise medical bill for each level of state surprise billing protection and each age group. The probability was calculated using the estimated coefficients for each respondent, with the variable of interest set to a specific value (e.g., state surprise billing protection set to comprehensive), while the respondents' original values were maintained for the other variables. Consumers covered by employer-sponsored health plans in states that have implemented comprehensive surprise billing protection laws have an 8% (0.44–0.36) higher probability of having received a surprise medical bill than if they lived in a state with no surprise billing protection. They have an 11% (0.44–0.33) higher probability of having a surprise medical bill than if they lived in a state with limited state surprise billing protection. The probability of having received a surprise bill for a respondent ages 45 to 60 was 9% higher than for respondents ages 18 to 29, 3% higher than for respondents ages 30 to 44, and 9% higher than for respondents age 60 or older.

Table 4: Average Predicted Probability of Having Received a Surprise Medical Bill for Each Category

	(1)
Variables	**Predicted Probability of Having Received a Surprise Medical Bill**
State Surprise Billing Protections	
No Protection	0.3642***
	(0.0300)
Limited Protection	0.3380***
	(0.0347)
Comprehensive Protection	0.4492***
	(0.0243)

13. A reviewer suggested that the Definition of Surprise Billing variable may be endogenous. Thus, we conducted an endogeneity test, using the health literacy variables as the instruments for the Definition of Surprise Billing variable in an extended order probit model. The results, which are in the Appendix Table 6A, did not indicate endogeneity.

14. At a reviewer's suggestion, we conducted a Chi-Square test to examine the relationship between the Definition of Surprise Billing and State Protection Approach variables. The test indicated that the variables were independent for both the full sample and the ESI/COBRA subsample. This suggests that consumers in states with surprise billing restrictions were not more aware of the issue. The sample size was insufficient for a valid regression model using only the subsample of respondents who correctly defined surprise billing. However, the Wald Chi-Square tests of these regressions were insignificant, with a p-value of 0.39 for the full sample and 0.52 for the ESI/COBRA subsample.

Definition of a "surprise medical bill?"	
Incorrect or don't know responses	0.3633***
	(0.0183)
Bill for services from out-of-network provider	0.5502***
	(0.0397)
Health Insurance Literacy Index 1	
0	0.3896***
	(0.0571)
1	0.3772***
	(0.0330)
2	0.4103***
	(0.0209)
Health Insurance Literacy Index 2	
0	0.4279***
	(0.0536)
1	0.3994***
	(0.0308)
2	0.3958***
	(0.0212)
Age	
18–29	0.3462***
	(0.0359)
30–44	0.4085***
	(0.0318)
45–60	0.4398***
	(0.0279)
>60	0.3459***
	(0.0512)
Gender	
Male	0.3835***
	(0.0243)
Female	0.4155***
	(0.0238)
Household Income	
$0–$49,999	0.4079***
	(0.0334)
$50,000–$99,999	0.3892***
	(0.0246)
$100,000–$149,999	0.4364***
	(0.0401)
$150,000+	0.3662***

	(0.0523)
Employment Status	
Employed, working full-time	0.4087***
	(0.0197)
Disabled, not able to work	0.2371*
	(0.1280)
Not employed, NOT looking for work	0.3162***
	(0.0622)
Not employed, looking for work	0.3823***
	(0.0773)
Employed, working part-time	0.3923***
	(0.0510)
Retired	0.4811***
	(0.0987)
Observations	840

NOTE: Standard Errors in parentheses; asterisk denotes significance levels with *** p<0.01, ** p<0.05, * p<0.1

Figure 1 visualizes the predicted probability of having received a surprise bill for each level of state surprise billing protection for those who correctly defined surprise billing and those who did not. Consumers who chose the correct definition and lived in a state with comprehensive consumer protection had the highest probability (60%) of having reported a surprise bill.

Figure 1: Predicted Probability of Having Received a Surprise Medical Bill by State Surprise Billing Protection Approach and Respondents' Chosen Definition of Surprise Billing

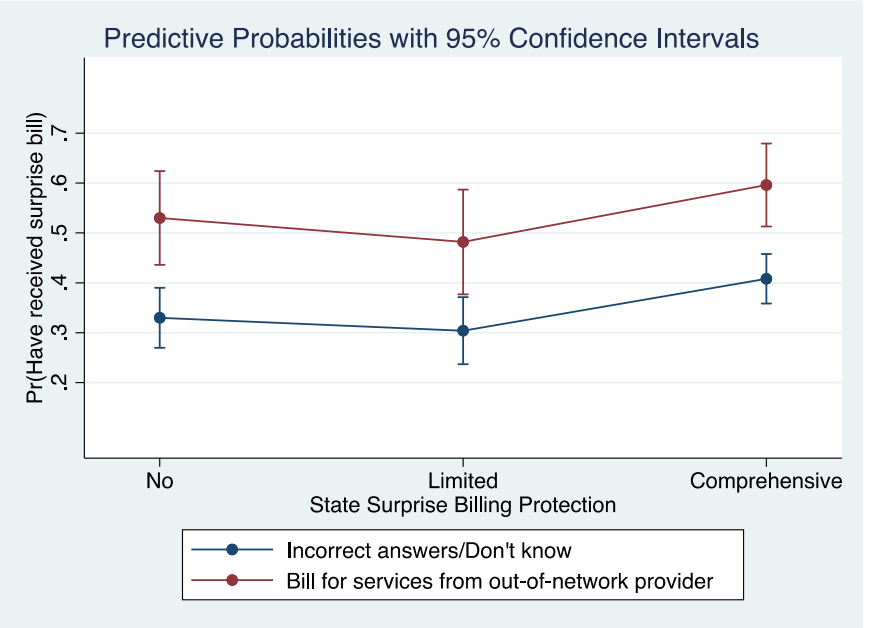
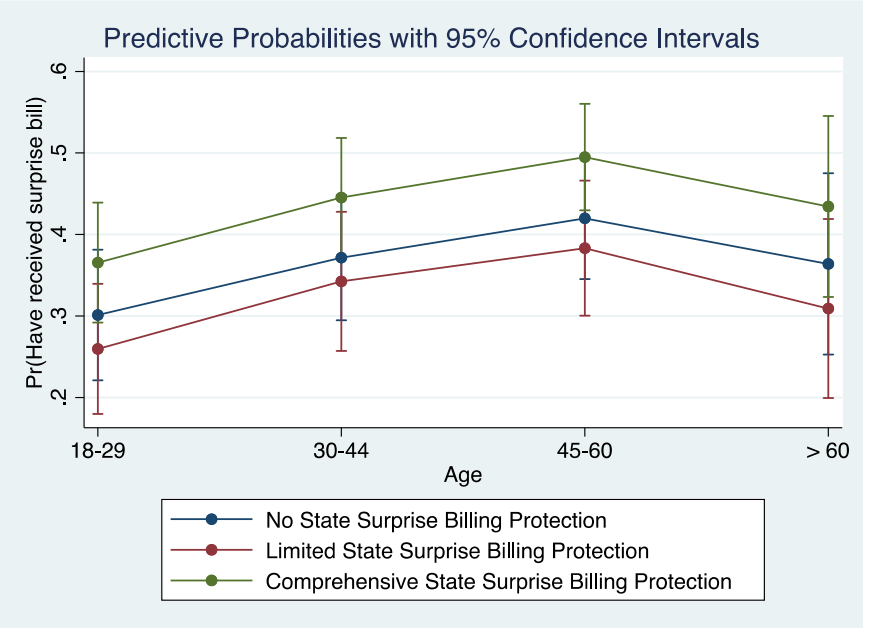


Figure 2 visualizes the predicted probability for each level of state surprise billing protection in each age group. It is obvious that the states with comprehensive balance billing protections and the age group of 45 to 60 are the two categories with the highest probability of having received a surprise medical bill. There was a 49% probability that a consumer ages 45 to 60 who was covered by an employer-sponsored health plan and lived in a state with comprehensive surprise billing protection would have received a surprise medical bill.

Figure 2: Predicted Probability of Having Received a Surprise Medical Bill by Age and State Surprise Billing Protection Approach



5.2. Robustness Check

Differences in the health care structure of each state, such as the number of hospitals, the number of physicians (particularly those not chosen by the patient, such as emergency medicine physicians, anesthesiologists, and radiologists), and the number of health insurance companies could also affect the incidence of surprise billing. The contracting friction between hospitals, physicians, and insurers increases as their numbers increase. We anticipated that with larger numbers, the odds will increase that a patient who seeks some types of care, such as emergency care, will encounter providers that are not in the same network as the facility where they treat patients.

To re-emphasize our main findings, we conducted a series of robustness checks by supplementing the variables in our initial regression (Equation 1) with variables measuring the average number of non-federal, short-term, acute care hospitals per

50 square miles (American Hospital Directory, 2020; States101.com, 2020);[15] the ratio of emergency medicine physicians to the total number of physicians in a state (KFF, 2021);[16] and the number of insurance companies that provide health coverage (NAIC, 2020)[17] in each state, respectively. Appendix Table 1A provides the emergency medicine physicians ratio and the number of hospitals in each state.[18] Appendix Table 2A provides descriptive statistics for these three new variables.

In the robustness check analyses, the number of hospitals per 50 square miles was added to the regression first (results in Column 1) in Table 5. Then, the ratio of emergency medicine physicians to the total number of physicians in the state was added (results in Column 2), followed by the number of health insurers in the state (results in Column 3).

Table 5 presents the results of the robustness check. The primary findings from our main logistic regression were preserved. As in the main regression analysis, respondents with employer-sponsored health plans were more likely to report surprise medical bills if they lived in states that have taken a comprehensive approach to surprise billing consumer protections (relative to states with no regulation), were ages 45 to 60 (relative to those ages 18 to 29), and correctly defined surprise billing (relative to those who did not).

The three models reported in Table 5 show that the number of hospitals per 50 square miles was a positive and weakly significant predictor of the incidence of surprise medical billing. The results suggest that as the number of hospitals increases, contracting friction increases, which in turn increases the odds that a patient will be treated by an out-of-network provider. However, neither the ratio of emergency medicine physicians to the total number of physicians in a state nor the number of health insurers in a state was significant.[19] Perhaps neither is an ideal measure of contracting friction. There are two possible reasons for this. First, an emergency medicine physician could see patients from across the country, so a state-level measurement might not be sufficient. Second, physicians who face inelastic demand, such as emergency medicine physicians, may deliberately choose to stay out-of-network as a strategy to negotiate higher in-network payments with insurers as a profit-maximizing strategy (Adams, 2021). Thus, simply using the ratio or the number of such physicians may not capture the influence on unexpected out-of-network bills. Research by Sen et al. (2021) suggests that laboratory services might be another potential measure. The researchers used data from Truven MarketScan Commercial Claims databases and reported that out-of-network laboratory services were five times more common than out-of-network emergency department visits and 34 times more common than out-of-network anesthesiology services.

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15. Number of hospitals is from the American Hospital Directory; land area of each state is from *states101.com*.

16. Number of physicians is from the Professionally Active Specialist Physicians by Field as of March 2021.

17. Number of health insurance companies is from NAIC 2020 Schedule T Health Financial Fillings as of June 22, 2020.

18. We do not disclose the insurer numbers in the Appendix Table 1A, as it is confidential data acquired via the NAIC.

19. We also used the number of emergency medicine physicians, as well as the ratio (and the number) of emergency medicine physicians, radiologists, and anesthesiologists. The variables were insignificant in all analyses, and the estimation results were similar to those presented here. These regression results are available upon request.

Table 5: Logistic Regression Robustness Check

Variables	(1) Received a surprise out-of-network medical bill?	(2) Received a surprise out-of-network medical bill?	(3) Received a surprise out-of-network medical bill?
State Surprise Billing Protections (Reference group = No protection)			
Limited Protection	-0.0344	-0.0366	-0.0567
	(0.2269)	(0.2270)	(0.2279)
Comprehensive Protection	0.4298**	0.4330**	0.3973**
	(0.1891)	(0.1894)	(0.1917)
How would you define a "surprise medical bill?" (Reference group = Incorrect or don't know response)			
Bill for services from out-of-network provider	0.7812*** (0.1855)	0.7720*** (0.1863)	0.7722*** (0.1864)
Health Insurance Knowledge Index 1 (Reference group = 0)			
1	-0.0625	-0.0601	-0.0506
	(0.2875)	(0.2884)	(0.2880)
2	0.0880	0.0864	0.0860
	(0.2718)	(0.2725)	(0.2716)
Health Insurance Knowledge Index 2 (Reference group = 0)			
1	-0.1403	-0.1465	-0.1362
	(0.2672)	(0.2668)	(0.2668)
2	-0.1375	-0.1417	-0.1306
	(0.2503)	(0.2502)	(0.2502)
Age (Reference group = Ages 18–29)			
30–44	0.3159	0.3140	0.2995
	(0.2172)	(0.2172)	(0.2163)
45–60	0.4432**	0.4466**	0.4375**
	(0.2086)	(0.2088)	(0.2080)
>60	0.0325	0.0332	0.0218
	(0.2974)	(0.2978)	(0.2980)
Gender (Reference group = Male)			
Female	0.1143	0.1155	0.1136
	(0.1538)	(0.1539)	(0.1540)
Household Income (Reference group = $0–$49,999)			

$50,000–$99,999	-0.0848	-0.0795	-0.0805
	(0.1840)	(0.1839)	(0.1838)
$100,000–$149,999	0.1095	0.1090	0.1154
	(0.2285)	(0.2285)	(0.2290)
$150,000+	-0.2074	-0.1899	-0.1645
	(0.2839)	(0.2852)	(0.2861)
Employment Status (Reference group = Employed, working full-time)			
Disabled, not able to work	-0.7978	-0.7752	-0.7306
	(0.7369)	(0.7445)	(0.7624)
Not employed, NOT looking for work	-0.4042	-0.4031	-0.4227
	(0.3122)	(0.3102)	(0.3103)
Employed, working part-time	-0.0443	-0.0424	-0.0460
	(0.2430)	(0.2431)	(0.2433)
Retired	0.2857	0.2934	0.2865
	(0.4251)	(0.4267)	(0.4314)
Hospitals (Number of hospitals per 50 square miles)	0.5672*	0.6222*	0.6137*
	(0.3296)	(0.3598)	(0.3501)
Emergency Department Physician Ratio (Relative to total number of physicians in that state)		2.6530	2.3042
		(3.9873)	(4.0247)
Health Insurers (Number in state)			0.0032
			(0.0032)
Constant	-1.0579***	-1.3528**	-1.4821**
	(0.3773)	(0.5855)	(0.5987)
Observations	840	840	840
Pseudo R^2	0.0384	0.0388	0.0396

NOTE: Robust Standard Errors in parentheses; asterisk denotes significance levels with *** p<0.01, ** p<0.05, * p<0.1

6. Discussion

Given its scope, the No Surprises Act (NSA) newly protects many patients with employer-sponsored health plans from surprise out-of-network bills for: 1) emergency care at an out-of-network facility; and 2) non-emergency care provided by an out-of-network provider at an in-network facility. By extending new protections to self-insured group health plans, the NSA is expected to address some of the gaps identified in this study, regardless of whether a state has its own ban on surprise medical bills.

Yet, the legislation's impact depends to a large extent on how the new federal law is implemented and enforced by federal and state insurance regulators. The Biden administration has issued several interim final rules to implement major parts of the new law. These rules have focused on patient disclosures, notice and consent waivers, consumer complaint processes, and mechanisms to resolve remaining payment

disputes between payers and out-of-network providers. With much at stake for patient out-of-pocket costs and premiums, federal and state officials are likely to closely monitor and adjust these requirements as needed.

In the meantime, state insurance regulators will continue to play a prominent role in protecting consumers from out-of-network surprise medical bills. First, the NSA affirms that states remain the primary regulators of fully insured health insurance products. As such, state insurance departments can choose to enforce the NSA's requirements on insurers that offer group or individual health insurance coverage. If a state fails to substantially enforce the NSA, federal officials will step in to do so. The U.S. Department of Labor (DOL) will continue to regulate self-insured group health plans. Second, the NSA extends the same cooperative enforcement framework to health care providers and facilities. Thus, states are responsible for directly enforcing the law's new standards against providers and facilities. In states that fail to do so, federal officials will step in. Third, states can continue to amend or adopt new laws on out-of-network surprise medical bills in the fully insured market. This may be particularly important to address potential loopholes in the NSA or bar out-of-network bills from entities such as ground ambulances that the federal law does not currently cover.

States may also want to address the payment standards or methods that apply to the fully insured market. Although the NSA sets new minimum federal standards that protect consumers in all states, Congress recognized that states already have adopted (or will adopt) their own methods to resolve payment disputes between payers and out-of-network providers. As such, the NSA defers to "specified state laws" that define how payers and out-of-network providers should resolve payment disputes and calculate patient cost-sharing. States with existing payment methodologies, whether a set payment standard, arbitration, or a hybrid approach, can choose to maintain those standards or not (Hoadley et al., 2019). States without existing standards can adopt them anew, but specified state laws will apply only to the fully insured market and any self-insured plans that opt in to state protections. The NSA will apply to self-insured plans.

As such, insurers, self-insured plans, and providers could find themselves regulated under both state law and the NSA in ways that creates inefficiencies, administrative costs, and unnecessary complexity. Fortunately, states can draw on the experiences of others. For example, Adler et al. (2021) used Health Care Cost Institute (HCCI) data to examine the influence of Connecticut's Surprise Billing Law, which went into effect in 2016, on the emergency medicine market. They found substantial increases in allowed amounts paid to emergency medicine physicians from fully insured plans and suggested that the higher allowed amounts were likely to be passed on to the insured in the form of higher premiums. One of the authors' recommendations was that states consider adopting the federal payment standards in the NSA. Chartock et al. (2021) examined New Jersey's final-offer arbitration system using administrative data from state arbitration data and Medicare and commercial insurance claims data. They reported that basing arbitration decisions on a payment standard, such as the 80th percentile of provider changes, seems likely to increase health care costs and incentivize providers to inflate charges. Among their recommendations were providing arbitrators with information about commercial in-network prices and Medicare

payment rates. Additional study and close monitoring by state and federal officials and researchers will be needed to ensure that implementation of the NSA does not result in higher premiums over time and that patients remain protected from these types of out-of-network surprise medical bills.

One resource that can be helpful to both state and federal insurance regulators in the implementation of the NSA is the Commonwealth Fund's (2021) interactive map. This map, which is available at *https://www.commonwealthfund.org/publications/maps-and-interactives/2022/feb/map-no-surprises-act*, provides a summary of the roles of state and federal governments in the enforcement of the NSA. It also provides information about state laws for payment determination, the dispute resolution process, and the use of external review in surprise billing.

7. Conclusion

Surprise out-of-network medical billing exposes patients to significant financial risks, undercuts the functioning of the health care markets to set competitive prices, and raises the cost of health care. At the time this study was conducted, there were no federal protections against surprise medical billing, and states' responses varied. Although comprehensive state laws are the most ambitious, they do not apply to people who receive insurance coverage from self-insured group plans. Consistent with this reality, our study provides empirical evidence that individuals who have employer-sponsored health plans are more likely to have received a surprise out-of-network medical bill if they live in a state taking a comprehensive consumer protection approach than those who live in states taking no actions. We suggest several explanations for this. However, one is the inability of states to regulate self-insured group plans, highlighting the importance of the NSA.

This study also provides empirical evidence that consumers ages 45 to 60 are more likely to have received a surprise bill than those ages 18 to 29. This finding is consistent with the age distribution of those on whom most of the surgical and non-surgical procedures are performed during ambulatory surgery visits to hospitals and ambulatory surgery centers. It is also worth noting that the income variable was not significant in any of the regression analyses, suggesting that the problems created by surprise billing are not confined to those with lower incomes.

In addition, we should note that when we asked respondents to choose a definition of surprise medical billing from four options, the largest proportion (38%) chose, "A bill for services or medications that the insurance company said it would pay but now it won't," rather than the "correct" response, "A bill for the charges when you use a provider who is outside your health insurance network, even if you didn't choose the outside provider," which only about 19% selected. We would have far less confidence in our results had we not phrased the survey question about receipt of surprise medical bills precisely and given them a definition before asking the question, "Have you or a family member ever received a surprise *out-of-network* medical bill?" Recognizing the lack of a uniform understanding of the term is instructive not only for research but also for consumer information and education efforts related to surprise medical billing, as well as more general knowledge about health plan coverage and provider networks.

As with all research based on survey data, our study has limitations. An important one is the phrasing of the question about receipt of out-of-network surprise medical bills. The question asked respondents if they had *ever* received a surprise medical bill (emphasis added). No doubt we would have more confidence in our results if the question had specified a time period. There is debate in the literature about the optimal recall period for survey research (Clarke et al., 2008). The wording of the survey question introduces the possibility that the respondent may have recalled a surprise medical billing from the past, perhaps before a state passed legislation or when the respondent was covered by a different type of insurance. Another limitation is the limited number of questions used to measure health insurance literacy. A best practice in measuring knowledge is to identify the relevant domains that make up that knowledge and include three to five items to measure each (Huston, 2010). In addition, more recent research regarding financial literacy indicates that self-assessed financial knowledge may be as or more important than objectively measured financial knowledge in predicting behaviors (Nicolini, 2022).

A potential area of future study could be to analyze the impact of the NSA on several areas, including health care costs, especially the physician markets that have historically had a higher incidence of surprise bills. Future research could also monitor and investigate potential gaps in the scope of the NSA.

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Appendix

Table 1A: State Surprise Billing Protection Approach, Physicians in Emergency Medicine Relative to Number of Physicians in the State, Number of Hospitals per 50 Square Miles

State Name	State Protection Approach	Emergency Department Physician/Total Number of Physicians	Hospitals/50 Square Miles
California	Comprehensive	10%	0.109450
Colorado	Comprehensive	13%	0.027016
Connecticut	Comprehensive	9%	0.351059
Florida	Comprehensive	10%	0.199535
Illinois	Comprehensive	13%	0.127885
Maine	Comprehensive	14%	0.030801
Maryland	Comprehensive	7%	0.272988
New Hampshire	Comprehensive	11%	0.078190
New Jersey	Comprehensive	10%	0.530318
New Mexico	Comprehensive	13%	0.015252
New York	Comprehensive	9%	0.197341
Oregon	Comprehensive	12%	0.019273
Texas	Comprehensive	10%	0.069096
Washington	Comprehensive	11%	0.045895
Arizona	Limited	12%	0.033893
Delaware	Limited	15%	0.205269
Indiana	Limited	10%	0.142355
Iowa	Limited	8%	0.035806
Massachusetts	Limited	8%	0.461537
Minnesota	Limited	10%	0.034536
Mississippi	Limited	12%	0.073524
Missouri	Limited	10%	0.060371
Nebraska	Limited	8%	0.017573
Nevada	Limited	13%	0.014119
North Carolina	Limited	11%	0.111070
Pennsylvania	Limited	12%	0.197798
Rhode Island	Limited	16%	0.531925
Vermont	Limited	8%	0.037975
West Virginia	Limited	14%	0.068640

Alabama	No Protection	8%	0.007886
Alaska	No Protection	15%	0.009873
Arkansas	No Protection	9%	0.049005
District of Columbia	No Protection	9%	5.737705
Georgia	No Protection	11%	0.096499
Hawaii	No Protection	12%	0.108987
Idaho	No Protection	12%	0.010890
Kansas	No Protection	8%	0.033636
Kentucky	No Protection	11%	0.094970
Louisiana	No Protection	10%	0.124988
Michigan	No Protection	17%	0.092857
Montana	No Protection	11%	0.006527
North Dakota	No Protection	7%	0.007246
Ohio	No Protection	13%	0.178655
Oklahoma	No Protection	13%	0.065603
South Carolina	No Protection	12%	0.111441
South Dakota	No Protection	6%	0.016488
Tennessee	No Protection	8%	0.121256
Utah	No Protection	11%	0.021297
Virginia	No Protection	11%	0.115219
Wisconsin	No Protection	10%	0.072012
Wyoming	No Protection	13%	0.007210

NOTES: The information in this table is as of January 2020. It would be interesting to investigate whether there are observable differences between states based on when surprise billing protections were in place. However, it is challenging to make that determination, given that it may have taken multiple laws to create a state's protections, particularly for those states using a comprehensive approach.

Since January 2020, four other states have passed legislation that the Commonwealth Fund considers comprehensive; i.e., Georgia, Michigan, Ohio, and Virginia. For the most current information about state surprise billing legislation, visit the Commonwealth Fund's website at *https://www.commonwealthfund.org/sites/default/files/2021-03/Hoadley_state_balance_billing_protections_table_02052021.pdf*.

Table 2A: Descriptive Statistics of the Supplementary Controls

Variable	Mean	Standard Deviation	Min	Max	N
Hospitals per 50 square miles	0.140	0.223	0.007	5.738	840
Emergency department physician ratio by state	10.79	1.88	5.64	16.69	840
Number of health insurers by state	59.79	23.72	18	109	840

Table 3A: Logistic Regression Results for ESI and COBRA Covered Respondents Using a Separate Category for the Four States with Opt-In Options for Self-Funded Plans for the State Protection Variable

	Have you or a family member ever received a surprise out-of-network medical bill?	
	(1)	(2)
Variables	Coefficient	Odds Ratio
State Surprise Billing Protections (Reference group = No protection)		
Limited Protection	-0.1306	0.8776
	(0.2115)	(0.1856)
Four States with Opt-In Option	0.3455	1.4126
	(0.3244)	(0.4583)
Comprehensive Protection	0.3710**	1.4492**
	(0.1745)	(0.2529)
Definition of a "surprise medical bill" (Reference group = Incorrect or don't know response)		
Bill for services from out-of-network provider	0.7832***	2.1885***
	(0.1854)	(0.4057)
Health Insurance Knowledge Index 1 (Reference group = 0)		
1	-0.0622	0.9397
	(0.2882)	(0.2708)
2	0.0893	1.0934
	(0.2715)	(0.2969)
Health Insurance Knowledge Index 2 (Reference group = 0)		
1	-0.1230	0.8842
	(0.2665)	(0.2356)
2	-0.1433	0.8665
	(0.2496)	(0.2163)
Age (Reference group = Ages 18–29)		
30–44	0.2771	1.3192
	(0.2173)	(0.2866)
45–60	0.4078*	1.5035*
	(0.2083)	(0.3132)
>60	-0.0000	1.0000
	(0.2970)	(0.2970)
Gender (Reference group = Male)		
Female	0.1422	1.1528
	(0.1532)	(0.1766)
Household Income (Reference group = $0–$49,999)		

$50,000–$99,999	-0.0764	0.9265
	(0.1829)	(0.1695)
$100,000–$149,999	0.1304	1.1393
	(0.2291)	(0.2610)
$150,000+	-0.1864	0.8299
	(0.2831)	(0.2350)
Employment Status (Reference group = Employed, working full-time)		
Disabled, not able to work	-0.8299	0.4361
	(0.7394)	(0.3224)
Not employed, NOT looking for work	-0.4252	0.6536
	(0.3139)	(0.2052)
Not employed, looking for work	-0.1135	0.8927
	(0.3549)	(0.3168)
Employed, working part-time	-0.0689	0.9334
	(0.2424)	(0.2263)
Retired	0.3066	1.3588
	(0.4215)	(0.5728)
Constant	-0.8895**	0.4109**
	(0.3590)	(0.1475)
Observations	840	840
Pseudo R^2	0.0353	0.0353

NOTE: Robust Standard Errors in parentheses; asterisk denotes significance levels with *** p<0.01, ** p<0.05, * p<0.1

Table 4A: Logistic Regression Results for Respondents' Experience with Surprise Medical Billing

	Have you or a family member ever received a surprise out-of-network medical bill?
Variables	**Coefficient**
What is your primary source of insurance (Reference group = ESI/COBRA)	
Medicare/Medicaid/Military	-0.2381**
	(0.1217)
Private Insurance bought myself/I don't have health insurance/Other	-0.2807*
	(0.1587)
Constant	-0.4055***
	(0.0705)
Observations	1,505
Pseudo R^2	0.0028

NOTE: Robust Standard Errors in parentheses; asterisk denotes significance levels with *** p<0.01, ** p<0.05, * p<0.1

Table 5A: Probit Regression with State Surprise Billing Protections Being Instrumented by State Health Care Structure Measures – ESI and COBRA Subsample

Variables	Coefficient	Robust Standard Error	z	P>z	[95% Confidence Interval]	
Have Received Surprise Bills						
State Protection (Reference group: No protection)						
Limited	0.258	0.296	0.870	0.382	-0.321	0.838
Comprehensive	0.893	0.568	1.570	0.116	-0.220	2.006
Health Insurance Literacy Index 1 (Reference group = 0)						
1	-0.034	0.169	-0.200	0.843	-0.365	0.298
2	0.055	0.159	0.350	0.728	-0.257	0.367
Health Insurance Literacy Index 2 (Reference group = 0)						
1	-0.069	0.158	-0.440	0.663	-0.378	0.241
2	-0.071	0.148	-0.480	0.629	-0.361	0.218
Definition of a "surprise medical bill?" (Reference group = Incorrect or don't know)						
Bill for services from out-of-network provider	0.466	0.112	4.170	0.000	0.247	0.686
Age (Reference group = 18–29)						
30–44	0.172	0.128	1.340	0.179	-0.079	0.424
45–60	0.253	0.124	2.050	0.041	0.011	0.496
>60	0.002	0.176	0.010	0.989	-0.343	0.348
Gender (Reference group = Male)						
Female	0.073	0.092	0.800	0.424	-0.106	0.253
Household Income (Reference group = $0–$49,999)						
$50,000–$99,999	-0.057	0.108	-0.530	0.599	-0.269	0.155
$100,000–$149,999	0.061	0.136	0.450	0.653	-0.205	0.328
$150,000+	-0.111	0.168	-0.660	0.510	-0.440	0.219
Employment Status (Reference group = Employed, working full-time)						
Disabled, not able to work	-0.479	0.445	-1.080	0.281	-1.350	0.392
Not employed, NOT looking for work	-0.262	0.182	-1.440	0.151	-0.620	0.095
Not employed, looking for work	-0.081	0.206	-0.390	0.694	-0.484	0.322

Employed, working part-time	-0.036	0.143	-0.250	0.800	-0.317	0.245
Retired	0.170	0.252	0.670	0.500	-0.324	0.665
State Protection						
Hospitals (per 50 square mile)	0.266	0.358	0.740	0.458	-0.437	0.968
Emergency Department Physician Ratio	-5.332	2.553	-2.090	0.037	-10.335	-0.329
Health Insurers	0.010	0.002	5.910	0.000	0.007	0.014
Correlation (error.StateProtection, error.HaveReceivedSurpriseBill)	-0.323	0.294	-1.100	0.272[20]	-0.753	0.300
Observations 840	Wald chi2(19)	44.25	Prob>Chi2	0.0009		

Table 6A: Probit Regression with Surprise Billing Definition Being Instrumented by Health Insurance Literacy Indexes – ESI/COBRA Subsample

Variables	Coefficient	Robust Standard Error	z	P>z	[95% Confidence Interval]	
Have Received Surprise Bills						
State Protection (Reference group: No protection)						
Limited	-0.027	0.138	-0.200	0.842	-0.297	0.242
Comprehensive	0.263	0.114	2.310	0.021	0.040	0.486
Age (Reference group = 18–29)						
30–44	0.192	0.130	1.470	0.140	-0.063	0.447
45–60	0.274	0.125	2.190	0.029	0.029	0.520
>60	0.002	0.176	0.010	0.989	-0.343	0.348
Gender (Reference group = Male)						
Female	0.090	0.093	0.960	0.335	-0.093	0.273
Household Income (Reference group = $0–$49,999)						
$50,000–$99,999	-0.041	0.111	-0.370	0.711	-0.259	0.177
$100,000–$149,999	0.080	0.140	0.570	0.566	-0.194	0.355
$150,000+	-0.099	0.172	-0.570	0.565	-0.436	0.238
Employment Status (Reference group = Employed, working full-time)						
Disabled, not able to work	-0.525	0.456	-1.150	0.249	-1.419	0.368
Not employed, NOT looking for work	-0.264	0.189	-1.400	0.162	-0.634	0.106
Not employed, looking for work	-0.086	0.212	-0.400	0.686	-0.502	0.330
Employed, working part-time	-0.041	0.148	-0.280	0.780	-0.332	0.249
Retired	0.199	0.258	0.770	0.411	-0.306	0.704

20. Not significant; thus, the State Protection variable is not endogenous in the ESI/COBRA subsample.

Definition of a "surprise medical bill?" (Reference group = Incorrect or don't know)						
Bill for services from out-of-network provider	0.319	0.813	0.390	0.695	-1.274	1.912
Definition of a "surprise medical bill?"						
Health Insurance Literacy Index 1 (Reference group = 0)						
1	0.358	0.221	1.620	0.105	-0.075	0.790
2	0.435	0.202	2.160	0.031	0.040	0.831
Health Insurance Literacy Index 2 (Reference group = 0)						
1	0.291	0.208	1.400	0.162	-0.117	0.700
2	0.445	0.197	2.260	0.024	0.059	0.830
Correlation (error.StateProtection, error.HaveReceivedSurpriseBill)	0.089	0.457	0.200[21]	0.845	-0.672	0.759

Observations	840	Wald chi2(15)	20.54	Prob>Chi2	0.1523

21. Not significant; thus, the definition of surprise medical bill variable is not endogenous in the ESI/COBRA subsample.