The Effect of Certificate-of-Need Laws on Substance Use Disorder Care for Vulnerable Populations

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Abstract: Substance use disorders are a prevalent and growing problem across the United States, especially for households that rely on publicly funded healthcare insurance plans. State Certificate of Need (CON) laws for substance use disorder (SUD) treatment facilities can worsen outcomes for these patients by restricting the supply of facilities and beds, leading to spillovers into the general hospital system. We present a choice theory for treatment facility patient admission and model the outcome as a function of the patient's insurance type. We then combine two datasets on state CON laws for SUD treatment facilities with Medicaid patient data from 2017 to 2020 to test the model using a three-stage least squares design and provide some of the first evidence on Medicaid patient outcomes under CON laws for SUD treatment facilities. We find significant evidence that state CON laws for SUD treatment facilities are associated with higher rates of hospital bed utilization, increases in the number of infants born with Neonatal Abstinence Syndrome, and higher rates of emergency department visits. Our findings are robust to several specification tests, including a model of conditional mixed method endogeneity and incorporating timing of the Affordable Care Act.

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Substance use disorders are a prevalent and growing problem across the United States, especially for financially vulnerable households that rely on publicly funded healthcare insurance such as state Medicaid plans. Vulnerable populations have reduced access to mental and behavioral health education resources, higher reported rates of substance use, and lower utilization of and access to substance use disorder (SUD) treatment facilities (Saunders, 2023). Children, including infants born to parents with substance use disorders, with public insurance plans are even more vulnerable to negative outcomes than the general population (Corr et al., 2021). At the same time, state-level Certificate of Need (CON) laws can worsen outcomes for these patients by restricting the availability of SUD treatment facilities. CON laws also potentially generate spillover effects from SUD treatment facilities to hospitals, including emergency departments. Identifying the effects of CON laws on individuals with substance use disorders could therefore help improve healthcare outcomes for vulnerable individuals and reduce inefficiencies in state healthcare systems.

CON laws raise barriers to entry for new healthcare facilities by requiring new entrants to receive permission to operate from existing providers (Baker and Stratmann, 2021). CON laws intentionally reduce the supply of healthcare providers and facilities in a state under the rationale that without CON laws, there would be an unsustainable number of competitors in a given healthcare setting but that with CON laws, patients would still be served by the existing providers. In contrast to theory, CON laws have instead been associated with decreased patient access to healthcare services throughout the literature for decades (Conover and Bailey, 2020). CON laws apply to many kinds of healthcare, including the addition of more hospital beds; beds outside of hospitals; medical equipment; healthcare facilities including hospitals; healthcare services, and emergency medical transport (Mitchell et al., 2021). Although the federal government removed its support and legal requirements for state CON laws in 1987, the majority of U.S. states still have CON law programs in place that cover nearly 40% of the population (Cavanaugh et al., 2020).

As of this writing, 23 states had CON laws regulating SUD treatment facilities, including laws restricting the addition of new residential and hospital facilities and the number of beds at facilities. Similar to most CON law types, these regulations are geared towards both requiring an approval process for increasing the number of beds within a facility by more than a certain percentage and expenditure purchases above a certain amount, although these amounts may differ by state from including any purchase to purchases above $1 or 2 million dollars. However, less is known about the effects of CON laws for SUD treatment facilities within the general CON literature, despite the fact that these laws restrict care for particularly vulnerable populations. This is in part due to the challenge of modeling the effects of CON laws for SUD treatment facilities on both the supply and demand sides of the market. For example, hospital CON laws can indirectly restrict the supply of hospital treatment facilities, such as when CON programs prevent hospitals from moving beds between departments (Roy Choudhury et al.,2022). On the demand side, a provider's decision on whether to admit patients may be driven by the patient's insurance type, as private insurance plans represent a larger profit margin for facilities than public insurance plans. This dual-system insurance structure suggests that when providers can choose which patients to admit, they will be less likely to admit patients with public insurance plans, on the margin (Terry-McElrath et al., 2010). CON laws for SUD treatment facilities had no effect on the proportion of SUD treatment facilities available to patients using Medicare or private insurance (Bailey et. al. 2022), but the demand-side effects on public insurance patients have been less studied. Although both Medicare and Medicaid plans have lower reimbursement rates compared with private insurance plans, patients on Medicare represent a smaller share of the impacted population for substance use disorders as compared with patients on Medicaid, and the decision choice of facilities may be difficult to measure below a defined demand threshold. We therefore build on the supply-side CON law literature and provide a new model for the demand side by estimating outcomes for Medicaid patients under CON laws for SUD treatment facilities.

As patients with public insurance are priced out of the supply-restricted market, they do not receive treatment at an earlier stage of substance use, or at all. They are therefore more likely to enter the hospital system, including through emergency departments, either as the only treatment available or due to an event like an overdose, increasing utilization in the general hospital system. CON laws for SUD treatment facilities can thus indirectly increase hospital utilization by restricting access to care at an earlier stage. The effects of CON laws for SUD treatment facilities may also have distributional effects within the public insurance population. Vulnerable groups within the population impacted by substance use, especially children and infants born to parents with substance use disorders, may be even more impacted by supply restrictions than the general population as they are unable to advocate for or choose their own healthcare treatment. We therefore also separately consider outcomes for children under these CON laws, specifically for infants born with Neonatal Abstinence Syndrome (NAS), as the most vulnerable members of the Medicaid population. NAS has several short- and long-term effects that can be potentially debilitating to newborns, including life-threatening withdrawal symptoms, cognitive and motor delays, dysregulation of central, autonomic, and gastrointestinal systems, and difficulty sleeping and eating (Logan et al., 2014). Infants born with NAS to parents with Medicaid, and emergency department visits by Medicaid beneficiaries with SUD can reliably proxy for the underlying SUD rate of the Medicaid population, as compared with self-reported survey data that may be manipulated or inaccurate (Jackson et al., 2005).

In order to model Medicaid patient outcomes under CON laws for SUD treatment facilities, we link state-level data on SUD treatment facilities, Medicaid enrollment and service use, and births with deliveries covered by Medicaid. We then merge this data with three independent data sources on CON laws for SUD treatment facilities. Our study period runs from January 2017 to March 2020, beginning from the point when substance use disorders in our study were reclassified, causing data prior to 2017 to be unreliable for comparison, to the beginning of the COVID-19 pandemic when

many states enacted temporary repeals of their CON laws. We employ a three-stage least squares empirical model to model the supply and demand of healthcare services under CON laws (Woolridge 2010) and provide some of the first evidence on CON laws for SUD treatment facilities on the Medicaid population.[4] We find significant evidence that CON laws are associated with higher rates of hospital bed utilization, increases in the number of infants born with NAS, and higher rates of emergency department visits. Our results are robust to several specifications, including a model of conditional mixed method endogeneity.

The paper proceeds as follows: Section 2 provides background on CON laws and a review of the literature; Section 3 presents our theoretical model; Section 4 discusses our data and empirical methodology; Section 5 reports our results; Section 6 provides additional tests for robustness. Section 7 provides a discussion; and Section 8 concludes.

2. Background and Literature Review

The first Certificate of Need regulation was piloted in New York in 1964 based on the idea that CON would limit unnecessary duplication of health facilities and maintain profitability for existing facilities by creating regional pseudo-monopolies. However, CON policies were often used to eliminate potential competition and led to reduced healthcare service availability for patients. Due to federal support and legislation through the 1974 *National Health Planning and Resource Development Act*, nearly all states adopted some version of CON by 1980. Citing concerns about supply restrictions and CON laws being used as a vehicle to eliminate competition, the federal government later withdrew its support and legal requirements for CON laws in 1987. Since then, roughly half of states with CON programs have repealed some, if not all, of their CON laws (Cavanaugh et al., 2022).

[4] "Hospital beds" refer to beds for SUD treatment within hospital facilities; "residential beds" refers to beds for SUD treatment within residential facilities (not within a hospital); NAS birth outcomes are per 10,000 births among Medicaid beneficiaries, and emergency department visits for SUD is per 10,000 emergency room visits by Medicaid beneficiaries.

The literature studying the effects of CON laws has overwhelmingly focused on healthcare spending, competition for niche services, and access to routine and nonroutine healthcare after the introduction or removal of CON laws. Although we do not attempt to replicate this discussion, we refer the reader to the comprehensive work of Conover and Bailey (2020), Baker and Stratmann (2021), and Bailey (2018) for an in-depth analysis of the history and effects of CON laws over time within the general population. We instead focus on a specific type of state-level CON law that regulates the addition of treatment facilities for substance use disorders. We also focus on the Medicaid population that disproportionately utilizes this healthcare service and contribute new evidence on patient outcomes under CON laws for SUD treatment facilities.

Substance use disorders are treatable and preventable mental disorders that affect brain chemistry and function, leading to the individual's inability to control the use of substances including alcohol, opioids, cannabis, stimulants, hallucinogens, or other legal or illegal drugs or medications. The federal government classifies substance use disorders as a type of disability (Robinson and Adinoff, 2016). For these individuals, substance use impairs the ability to fulfill obligations and may cause significant social and interpersonal problems (McNeely and Adam, 2020). The only known study that investigates the relationship between CON laws and SUD treatment facilities is Bailey et al. (2022), which finds that there was no statistically significant effect on the number of beds or facilities for patients with Medicare and finds a limited reduction of resources for those on private insurance. We extend this investigation and focus specifically on the Medicaid population which may be more vulnerable to changes in access, especially in the context of ongoing substance use epidemics, including the opioid epidemic (Leslie et al., 2019). The Medicaid population is also more appropriate for analysis than the often-used Medicare data since we are analyzing a birth-outcome, which are far less common above the age of 65 (the majority of the Medicare sample). As of 2021, 61.2 million people aged 12 or older used illicit drugs in the past year. Of these, 46.3 million people (16.5 percent of the U.S. population) meet the applicable DSM-5

criteria for having a SUD within the last year (SAMHSA, 2023). Individuals who meet the SUD criteria are disproportionately young, low-income, and low education. Although 16.5 percent of the general population meets the definition of having a SUD, these rates are much higher in the Medicaid population with over 21 percent having a mild, moderate, or severe SUD for one or more qualifying substance of alcohol, opioids, cannabis, or stimulants (Saunders, 2023).

The federal Affordable Care Act required state Medicaid programs to cover SUD treatment for the Medicaid expansion population beginning in 2014 (Shakya and Harris, 2022). This led to increases in insurance coverage but did not substantially increase the rate of SUD treatment used within the Medicaid population (Olfson et al., 2018). Although medication treatment for opioid-based SUD have become available at more facilities, the treatment was introduced more slowly in counties that are low-income, have high Medicaid enrollment, or have higher concentrations of Black or Hispanic residents (Stein et al., 2018). This disparity may be due to a need to train medical service providers and for clinical interventions, or may be related to the already high usage of existing treatment facilities and inability to add beds and other resources (Cummings et al., 2014). Our study considers the idea that CON laws for SUD treatment facilities may have prevented new or expanded treatment facilities from being available to the newly insured population, and we therefore analyze rates of SUD hospital bed utilization and SUD residential beds at SUD treatment facilities affected by CON laws.

3. Theoretical Model

Certificate of Need laws have been argued as a necessary restriction on the supply of medical services to induce a pseudo-monopoly, where a limited set of healthcare providers are able to maintain higher profit margins by limiting competition. In theory, this increased profit margin is intended to create an environment where providers can stay financially viable. In practice, the relationship has been more complicated, especially in marginalized and rural communities. Volumes of the CON literature have primarily focused on the supply effects of CON laws on

healthcare goods and services, but the literature has overwhelmingly disregarded the effects on community health. We employ a simple theoretical model that models the relationship between CON laws and community health for the Medicaid population. By limiting the analysis to only the supply for medical goods and services, rather than the effects on both the supply and demand for services, we find that the literature is underestimating the potential impact of CON laws on vulnerable populations.

Substance use disorders are often treatable with intensive in-patient care, but the condition is rarely resolved without some medical or psychological intervention. Treatment for substance use disorders, typically at addiction treatment facilities, is one of the few types of services that economists have widely agreed are underprescribed within the population (Bailey et al., 2022). However, states have different rules pertaining to the amount of capital a supplier may have in the facility, for example, hospital beds, to provide treatment. In non-CON states, the market theoretically converges to a competitive market equilibrium. However, within CON states, total capital investment is fixed which, in turn, affects the share of individuals with SUD within the population because the equilibrium does not approach the point where the price – here the Medicaid reimbursement – is equal to marginal cost, and the quantity of services demanded continues to exceed the quantity supplied in a standard model of a market shortage.

3.1. Demand for Healthcare Services

The simple model highlights the relationship between capital restrictions and the share of those who are considered in need of treatment withing the population. However, although one category of beneficiary costs should be covered through Medicaid, there are other costs to receiving treatment for SUD that are not covered by insurance, including the travel time to facilities, time away from formal employment, and the discomfort of the withdrawal and treatment process. Although patients who are beneficiaries of Medicaid may not experience direct pecuniary costs, there still are many nonpecuniary costs to treatment.

Patients with substance use disorders have preferences over treatment quality Q, leisure L, other consumption goods G, and treatment state E. The utility function will also be affected by a matrix of measured exogenous variables, X, which influence utility and unobservable components ε.

$$U = U(Q, L, G, E, X, \varepsilon) \qquad (1)$$

Treatment quality received is represented through a production function that includes nonpecuniary costs M and pecuniary costs N. For Medicaid beneficiaries, the pecuniary costs are assumed to be zero; therefore N is dependent on beneficiary type (C_1, C_2). These nonpecuniary costs are dependent on a bundle of characteristics, B, which may include travel time to facilities, time away from formal employment, the discomfort of withdrawal and the treatment process, etc. These costs will vary depending on the accessibility of treatment, which is determined by supply.

$$Q = Q(M, (N|C_1, C_2), B, X, v) \qquad (2)$$

Patients maximize the utility function subject to cost constraints, for which we assume there is no savings or borrowing.

$$\alpha + \pi + wh(e) + (p_{Q(A)}|C_1, C_2)Q_A - p_G G - f_E T = 0 \qquad (3)$$

Where α denotes transfer payments to a beneficiary (not including Medicaid payments to suppliers); π denotes income not affected by treatment status such as revenue from investments; w is the wage paid for h hours of work that is dependent on treatment state; $p_{Q(A)}$is the price of treatment, dependent on quality, Q, the amount of available slots at that quality type, for example treatment bed availability, A, and type of beneficiary (C_1, C_2); p_G is the price of other consumption goods. f_E represents the fixed nonpecuniary costs from T trips to consume treatment. Note that the quality within this equation is the same as the quality factor that is partially determined by the accessibility and cost of treatment in equation 2.

The level of treatment supply available to a patient, also referred to as treatment accessibility, can be rewritten as Ak_i to denote the number of slots (for example, the number of beds or treatments), provided by supplier i:

$$Ak_i = A_{1,1}, A_{2,1}, \dots, A_{n,1}; A_{1,2}, A_{2,2}, \dots, A_{n,2}; \dots A_{1,m}, A_{2,m}, \dots, A_{n,m} \quad (4)$$

This framework assumes the nonpecuniary costs are real costs in terms of both time and other expenditures. Therefore, beneficiaries with substance use disorders in communities with reduced access to the supply of treatments face greater constraints. This reduced access also suggests that supply restrictions and facility utilization rates constrain healthcare services uptake. Beneficiaries may even choose not to consume treatment if nonpecuniary costs are substantial, leading to higher SUD rates within the population as patients delay or avoid treatment, which affects demand in future periods. This may have adverse effects, such as increased use of emergency departments for treating SUD, and socially inefficient outcomes such as live births with NAS.

3.2. Supply of Healthcare Services

Economic models of healthcare services often assume two motivations for providers entering the market: making profits and alleviating individuals' suffering, in this case for substance use disorders. We refer to this joint function as provider satisfaction. Although all providers are assumed to have these motivations, the value placed on pecuniary and nonpecuniary benefits may differ depending on firm structure, for example, for-profit, not-for-profit, etc. Providers will determine the operational inputs, such as labor, skill, and capital. Therefore, the price of care is a function of quality, and determines revenue and costs. Under competitive market conditions, providers choose the level of quality that maximizes their satisfaction. In contrast, the CON pseudo-monopoly directly restricts competition from entering the market, keeping profits artificially high for existing firms, meaning that capital has a fixed maximum input under a CON program, for example, a maximum number of beds, medical equipment, or physical facilities.

For the sake of simplicity, providers may use their existing resources to serve one of two patient types. The first patient type has private insurance, which has a high reimbursement rate. The second patient type has public insurance, such as Medicaid, which has a low reimbursement

rate set through the federal government and assumed to be where the price is equivalent to the marginal cost of providing services. This leads to the profit function:

$$\mathbb{\Pi} = (p|C_1, C_2)A - wL - r(K|CON) \quad (5)$$

The profit function is described by price, dependent on patient insurance type (C_1, C_2), multiplied by the matrix of SUD treatment services offered by each firm; the matrix of health professionals with varying skill sets and quality level L; and the capital material K that goes into producing treatment services (for example, beds, equipment, space) that may either be variable and chosen by the firm in non-CON states, or is a fixed amount of capital in CON states. We assume providers have treatment production functions of the form $A(L, K)$ when not supply constricted, and $A(L)$ when CON laws are in place. Providers then demand labor according to:

$$L_{No\ CON} = L((p|C_1, C_2), w, r) \quad (6) \qquad L_{CON} = L((p|C_1, C_2), w) \quad (7)$$

That yields the profit function for each individual supplier as:

$$\mathbb{\Pi}_{No\ CON} = \mathbb{\Pi}((p|C_1, C_2), w, r) \quad (8) \qquad \mathbb{\Pi}_{CON} = \mathbb{\Pi}((p|C_1, C_2), w) \quad (9)$$

The supply function, being the partial derivative with respect to price, takes the forms:

$$\frac{\partial \mathbb{\Pi}_{No\ CON}}{\partial p} = a((p|C_1, C_2), w, r) \quad (10) \qquad \frac{\partial \mathbb{\Pi}_{CON}}{\partial p} = a((p|C_1, C_2), w) \quad (11)$$

Providers therefore do not choose the competitively provided quantity of the service. Instead, the quality of care and the price is separately determined within the market for private insurance and at the market equilibrium point of marginal cost for public insurance, including Medicaid beneficiaries. In this case, the available supply would decrease when the demand for resources decreased, and supply would increase when demand increased, for example, when there are higher SUD rates in the provider's market. However, when CON laws restrict supply, binding limits on treatment may lead to even higher SUD rates in the community, further increasing the demand for treatments.

4. Data and Empirical Methodology

We limit our study sample to January 2017 to March 2020. Although this is a limited time period, there are two important reasons for this limitation. First, in 2016, there were substantial changes to how Neonatal Abstinence Syndrome, maternal opioid-related diagnoses, and opioid use disorders were classified in the *International Classification of Disease, 10th Revision, Clinical Modification*. These changes affected how SUD rates were calculated and reported on discharge paperwork (Hirai et al., 2021). This revision causes pre-2017 and post-2017 data to be incomparable. Second, while the survey data described below was collected in early March 2020, and thus estimates for 2020 may be reliable, data after this time would be biased by the temporary repeals of CON laws during the COVID-19 pandemic that began in April 2020 (Roy Choudhury et al., 2022).

Descriptions and counts of SUD treatment facilities and the SUD treatment services rate were collected from the 2017-2020 National Survey of Substance Abuse Treatment Services (N-SSATS) and the National Mental Health Service Survey (N-MHSS). Both datasets are publicly available and processed annually since the Medicaid expansion by the Substance Abuse and Mental Health Service Administration in 2014. Although the data have a sufficiently sized survey response, this data may only be reliably used for average utilization rates for beds and services within facilities but not for the total count of beds as some facilities did not respond in a timely manner for the data to be correctly reported and as survey respondents are required to document utilization rates but are not required to consistently document the number of beds within each facility. Colorado and Hawaii are both excluded from the hospital bed utilization sample because they do not report hospital bed utilization rates dedicated for SUD treatment, and instead only report residential beds at SUD treatment facilities. Since the failure of some facilities to consistently report their total number of beds on an annual basis, we are unable to merge the two types of bed utilization- in-hospital treatment beds for substance use disorder and out-of-hospital residential treatment beds for substance use disorder. Instead, we model each separately and provide narrative insight of how they interrelate. Summary statistics on the utilization rate measures are in Table 1.

Data on the Medicaid population was collected from public dissemination files from the Center for Medicaid and CHIP Services (CMCS) within the Centers for Medicare and Medicaid Services (CMS). The counts of Medicaid beneficiaries, relevant diagnosis, and treatments were collected from the Transformed Medicaid Statistical Information System (T-MSIS) Analytic Files, specifically the data tables related to Enrollment and Service Use. The Neonatal Abstinence Syndrome (NAS) rates by pregnancy and by person within the population, including the dedicated set of birthing parents enrolled in Medicaid, were collected from the NAS Rates for Births with Deliveries Covered by Medicaid data files from 2017 to 2020. Similarly, aggregate data was also collected on emergency department visits by the Medicaid population, and the proportion of those visits related to any substance use disorder care. Summary statistics on NAS and emergency department visits are available in Table 1. Documenting and studying rates of NAS and emergency department visits allow us to more accurately proxy for demand and need for substance use treatment within the Medicaid population since survey data can be manipulated or inaccurate for self-reported substance use (Jackson et al., 2005).

Finally, the CON laws for SUD treatment facilities were collected from the "Mercatus Center at George Mason University, CON Laws in 2020: About the Update" report, which includes relevant datasets tracking CON laws by state (Mitchell et al., 2021). We confirmed the status of these CON laws using the "2020 Conning the Competition" dataset from the Institute for Justice (Cavanaugh et al., 2020) and the 2023 brief "CON Laws by the National Conference of State Legislatures". Using these data, we were able to identify CON laws which existed for beds, services, and equipment for SUD treatment in 23 states during our study period. There is no policy variation of CON law removal or expansion during the study period (see Figure 1).

For our empirical specification, we analyze outcomes of CON laws for SUD treatment facilities using the utilization of SUD treatment beds in both hospitals and SUD treatment facilities. These outcomes measure the supply-side effects of CON laws most prevalent in the literature and

represent the fixed capital investment constraint for the provider. The CON laws for SUD facilities affect both residential and in-hospital treatment facilities, but it is important to note that the in-hospital facilities may have additional restrictions, such as restrictions on moving patients between departments or moving beds from another department to the SUD treatment facility, even if the patients or beds are within the same building.

Inequalities in utilization of healthcare treatments for SUD may distort data reliability and collection for the total number of affected beneficiaries, rates of utilization by affected populations, or self-reported survey data (Terry-McElrath et al., 2010). Therefore, when analyzing the rate of SUD in the general population, we focus on two outcomes that proxy for the underlying rate of substance use in the aggregate Medicaid population that would not be affected by data reliability issues: emergency department visits for SUD and NAS, in which newborns experience withdrawal from drugs and other substances they have been exposed to in the womb before birth. The proportion of reproductive-aged women in the US who used opioids and other habit-forming substances for nonmedical purposes has increased over the past two decades, and polysubstance use among pregnant women is increasingly prevalent among lower education and low-income households and households using Medicaid (Jarlenski et al., 2017). Therefore, differences in the rate of births with withdrawal symptoms is reflective of specific population substance use.

Our theoretical model suggests that CON laws for SUD treatment facilities would also affect the SUD rate in the aggregate population, conditional on changes in the availability of beds designated for treatment of SUD patients. We proxy the population SUD rate by using two non-survey outcomes: the number of NAS births among each 1,000 Medicaid births and the rate of emergency department visits for SUD-related care among all emergency department visits for the Medicaid population.

We first account for the baseline relationships observed through naive empirical methods that do not factor in any cross-equation endogeneity. We therefore use a series of ordinary least square (OLS) equations that takes one of the following forms:

$$Y_{st} = \alpha + \delta_2 CON + \boldsymbol{Z} + \varepsilon_{st} \quad (12)$$

$$X_{st} = \lambda + \beta_2 CON + \boldsymbol{W} + \nu_{st} \quad (13)$$

Where Y_{st} are supply-side outcome variables associated with the amount of available treatment within the population, that is, the utilization of beds in hospitals and SUD treatment facilities. CON is a binary variable equal to 1 if the state has a CON law related to SUD treatment facilities. $\boldsymbol{Z}$ represents a vector of exogenous controls. Likewise, X_{st} are demand-side outcome variables associated with SUD within the population, that is, the NAS rate among births and emergency department use for complications related to SUD. $\boldsymbol{W}$ is a vector of exogenous controls related to treatment accessibility.

Most CON studies have only considered the supply effects of CON law. In the case of SUD, these supply restrictions may also affect community health outcomes through changes in demand through treatment uptake, the proportion of population with SUD, and the rate of negative outcomes associated with SUD. Reduced treatment uptake leads to a larger set of individuals needing treatment in future periods, with a mixed set of insurance and payment types that also affects treatment utilization rates and the provider's profit functions.

We next consider the following two simultaneous equations that are similar to the naive OLS but also incorporate the dependent variable of the other equation in the system, using the three-stage least-squares (3SLS) design:

$$Y_{st} = \alpha + \delta_1 X_{st} + \delta_2 CON + \boldsymbol{Z} + \varepsilon_{st} \quad (14)$$

$$X_{st} = \lambda + \beta_1 Y_{st} + \boldsymbol{W} + \nu_{st} \quad (15)$$

The 3SLS design generalizes the two-stage least-squares approach by allowing for correlations within the error terms of two or more equations with endogenous regressors to be determined

simultaneously rather than in sequence. In our case, we observe supply-side utilization rates under CON laws, and then include the estimates of supply in the regression for demand. The term "three-stage" terminology is a relic of 1960s nomenclature, as it is possible that there may be two, three, four, or more equations being simultaneously modeled (Zellner and Theil, 1962). The expansion beyond the two-stage version allows for a systematic extension of the homoskedasticity assumption to instead allow for differing covariances across equations. In this case, outcomes for the utilization and availability of treatments, Y_{st}[5], affect the proportion of the population with substance use disorders and the demand for SUD treatment within the Medicaid population, X_{st}, which we are also referring to as population health.

Allowing the number of beds and treatment uptake to affect changes in demand from increases in the proportion of the SUD population presents a more accurate depiction of how this form of regulation can affect community health through the availability of treatments. It is important to note that while the 3SLS is useful for developing comparative studies, it can be subject to bias from unobservable characteristics and the results should be considered a correlative investigation of the research question and not causal effects.

5. Results

The results of our simple OLS framework are depicted in Tables 2 and 3. Starting in Table 2, we report outcomes under CON laws for SUD treatment facilities using the utilization rates of beds that are earmarked for the use of SUD treatment in three models. Within Table 2, in the first three columns, we report the utilization rate of SUD treatment beds within hospital facilities, while the last three columns report the utilization of SUD residential beds within SUD non-hospital treatment facilities. As survey respondents are required to document utilization rates but are not required to consistently document the number of beds within each facility, we are unable to combine these two

[5] For further discussion about the assumptions of 3SLS models and their interpretation, the authors suggest referring to the excellent work of Jeffrey Woolridge, especially within his textbook on cross section and panel data (Woodridge, 2010).

measures for the study period as the number of hospital beds are not available for each year to convert the rate by subcategory, but utilization rate is consistently reported as part of the required documentation process. However, we provide context for how the data types work together in context of the larger literature.

We find that CON laws on SUD treatment facilities increase hospital bed utilization rates at hospital facilities, with a 51 percent increase in SUD bed use when a state introduces a CON law. In contrast, we find no measurable relationship between the utilization rate of residential beds at SUD treatment facilities. This finding is consistent with the literature which finds that the presence of CON laws is associated with fewer smaller or independent facilities, which causes those in need of services to utilize the general hospital system instead (Conover and Bailey, 2020; Shakya and Bretschneider-Fries, 2023). Also, fewer residential SUD treatment facilities report accepting Medicaid in states with CON laws for SUD treatment facilities relative to hospitals which are often publicly funded with federal requirements to accept Medicaid to have access to particular funds.

When considering Medicaid patient outcomes under CON laws for SUD treatment facilities, we use two well-documented proxy measures for the population SUD rate: birthing parents on Medicaid who give birth to infants with NAS, which is a reflection of recent and habitual substance use by the birthing parent, and SUD-related emergency department visits as a proportion of all emergency department visits by Medicaid patients, which is reflective of the rate of severe SUD within the Medicaid population. These proxy measures are unique in that they are not subject to common biases in data related to SUD, which is often collected through self-reported surveys that may be manipulated or inaccurate. Table 3 shows that CON laws for SUD treatment facilities are associated with 8 to 11 more NAS births per 1,000 live births within the Medicaid population. Likewise, CON laws for SUD treatment facilities are also associated with a 1 to 2 percent increase in SUD-related emergency department visits within all emergency department visits by Medicaid patients. These are substantial concerns, because it shows that CON laws for SUD treatment

facilities may not only affect the supply of healthcare services, which is often the focus in the literature, but also increase the utilization and need for other high-cost services such as emergency and neonatal care. For example, a non-complicated birth within the Medicaid population costs nearly $1,100 in Medicaid funds, but an infant born with NAS within the Medicaid population is seven times more expensive due to additional care needs, with an average cost of $7,800 per birth and the hospital stay for a NAS infant after birth costs $22,552 on average (AHRQ, 2022; Strahan et al., 2020). These initial results likely do not tell the whole story, as limits on the number of treatment beds may lead to higher rates of SUD in the population, affecting demand for SUD treatments as community health suffers. Using a 3SLS framework, we can incorporate this relationship by incorporating estimates for CON laws on SUD treatment facility bed utilization. Likewise, we can model how that supply-side utilization affects demand for other services and the prevalence of SUD in the Medicaid population.

For Tables 4 to 7, each simultaneous equation within the joint regression can be seen represented within a column, with the supply utilization within simultaneous equation 1 and the outcomes proxying for our understanding of SUD changes in the population (NAS and emergency department visits) are listed as simultaneous equation 2.

When considering hospital bed utilization and NAS (Table 4), we find that after allowing our estimates for hospital bed utilization to be affected by rates of NAS births, and NAS births to also affect utilization simultaneously, CON laws for SUD treatment facilities increase hospital bed designated for SUD treatment utilization by 18 to 20 percent. Compared to the OLS model, which estimated an increase of 51 percent when not accounting for how supply and demand shift simultaneously, the 3SLS model finds that CON laws for SUD treatment facilities are still large factor in the availability and use of SUD treatment. There is still a large and significant negative estimate to SUD treatment bed utilization from supply changes independent of demand changes when CON laws for SUD treatment facilities are present. After we account for how CON laws for SUD facilities

affects the supply of treatment beds, there is no longer a significant relationship between CON laws for SUD treatment facilities and rates of NAS in births to Medicaid patients, showing that much of the increase was related to changes in supply that affect aggregate population changes. By contrast, states without CON laws for SUD treatment facilities maintain lower treatment bed utilization within hospital settings, and also avoids the increase in infants suffering from NAS.

When instead focusing on changes in SUD treatment residential bed utilization (Table 5), we find that after accounting for changes in the SUD rate within the Medicaid population, as proxied by rates of NAS births to birthing parents on Medicaid, there is an insignificant positive relationship between CON laws and residential bed utilization for SUD treatment, similar to the OLS models. This makes intuitive sense because fewer residential SUD treatment facilities report accepting Medicaid in states with CON laws for SUD treatment facilities relative to hospitals which are often publicly funded with federal requirements to accept Medicaid to have access to particular funds.

We next report our second proxy for the SUD rate within the Medicaid population of SUD-related emergency department visits. Tables 6 and 7 use the dependent variable of the rate of emergency department visits for SUD-related care in the Medicaid population relative to all emergency department visits by Medicaid patients. When considering hospital bed utilization (Table 6), we find that when disaggregating the relationship for the Medicaid population's demand for SUD treatment, as proxied by the rate of emergency department visits, there is still a substantial effect from CON laws for SUD treatment facilities on hospital bed utilization, consistent with our earlier estimates, though at a lower magnitude of 10 to 11 percent. We find no relationship between residential bed utilization at SUD treatment facilities and emergency department visits (Table 7). This is unsurprising, as emergency departments are more likely to refer to departments within the facility and less likely to transfer patients to an external treatment facility directly without an initial hospital inpatient SUD care assessment, which in almost all cases require a departmental transfer.

All results were confirmed for robustness using the conditional mixed process endogeneity correction (Roodman, 2011). Results for all combinations of the simultaneous supply and demand equations are shown in the columns of Table 8. The results are consistent in magnitude, significance, and direction with the 3SLS estimates.

6. Robustness

As with most studies, there are always potential confounding factors that must be considered for context within our results. The first would be related to Medicaid expansions through the Affordable Care Act. While the Medicaid expansion moved to cover nearly all adults with incomes up to 138 percent of the federal poverty line, the implementation was staggered through states. Some states, such as California and Connecticut, were early expanding states choosing to implement their Medicaid expansion as early as 2011 and 2010, respectively. Roughly half the states expanded within 2014, and the others took many more years to implement their expansion.

The Medicaid expansion could clearly affect our sample group, as we are interested in healthcare access and use of care by the Medicaid population, so states which have already expanded may have greater demand for SUD disorder treatment by people covered by public insurance than within non-expanding states. To address this concern, we use the expansion dates specifically for substance use disorder treatment coverage, collected by Maclean and Saloner (2019). Using this data, we repeat our estimations both including expansion as an additional control variable, as well as also re-estimating the sample but limited to the 31 states that had expanded by the start of our sample period. Results maintained their direction and significance and did not have any major changes. Table 9 is provided is the replication of all 3SLS estimates with the most restrictive model.

7. Discussion

Our findings on patient outcomes under CON laws for SUD treatment facilities have serious policy implications for the prevalent and growing concern of substance use disorders within vulnerable

populations. Although these CON programs may only have marginal effects within the Medicare and private insurance population (Bailey et. al., 2022), negative patient outcomes appear to be much larger within the Medicaid population. As Medicaid recipients have twice the rate of NAS births per thousand (12.3 per 1,000 births) compared to the overall population (6.7 per 1,000 births), and disproportionately high emergency department use for SUD, the treatment facility availability is extremely important, especially when the failure to treat SUD patients in one period also increases the rate of SUD patients relative to treatment availability in future periods.

We find that CON laws for SUD treatment facilities affect the utilization rate of treatment beds both in hospital facilities. The higher utilization rate in turn affects the SUD rate within the population, leading to more infants suffering from NAS within the Medicaid population. This difference in outcomes represents not only the rate of a severe condition within newborn children, but the opportunity cost of funds that could be used for other Medicaid expenditures. For example, in 2019 the total cost billed to Medicaid for NAS births was $477 million, with an average post-birth hospital stay cost of $22,552 per NAS infant with an average hospital length of stay of 16.2 days (Strahan et al., 2020). States that did not have CON laws for SUD treatment facilities potentially saved tens of millions of dollars in cost reductions on neonatal infant care alone. Compared to the average SUD treatment cost of $13,475 for a non-complicated SUD rehabilitation with initial overnight stays, this can reflect an average cost savings between $8,000 and $9,000 dollars, in most cases. While cost estimates are not available for emergency department care for the Medicaid population, emergency departments represent the fastest growing expenditure in hospitals (Pickens et. al, 2022), and reductions in emergency department use by patients with SUD for emergent care who instead transitioned to facility care may also save millions of Medicaid dollars. Treating SUD patients earlier could also reduce the impact of future chronic conditions from substance use disorders, with significant cost savings (Deyo et al., 2015), as well as providing care for adolescent birthing parents on Medicaid (Barnett et al., 2021). Overall, CON laws for SUD

treatment facilities are associated with higher treatment bed utilization rates, and part of this increased utilization is accounted for by higher SUD rates within the population. States without CON laws had lower utilization rates, fewer infants with NAS, lower rates of emergency department visits for SUD care, and potentially had large cost savings to the Medicaid system.

It is important to note that this study is subject to limitations that should be addressed for transparency. The study period is limited to four years of data, during which there was no policy variation where CON laws for SUD treatment facilities were introduced or removed. This is due to the 2016 changes in classification changes related to SUD and NAS, which makes data prior to 2017 incomparable with data in future periods. Similarly, data prior to the pandemic would be a reliable reflection of SUD treatment facility residential bed utilization, but data after March 2020 would be affected by changes to medical services and temporary repeals or changes to CON laws in several states that began in April 2020. Although we did our best to account for the CON policies which would directly affect the treatment status of each state, we cannot rule out that there may be some specific states or situations where some hospitals may have had additional expenditure limits set by facility CON laws. Our results are also limited to state-level data, so we are not able to disaggregate estimates between rural and urban populations, which is a frequent concern when discussing Medicaid beneficiaries, access to care, and the cost of provided services. This is especially true for studies related to CON laws, as much of the argument for maintaining CON laws is related to rural healthcare access. Compelling extensions to this work should be undertaken to fully understand the relationship between CON laws for SUD treatment facilities and access to services over time.

8. Conclusion

State-level CON laws cover nearly half of the U.S. population, despite the decades-old withdrawal of federal support for the regulation and the extensive negative outcomes from CON laws documented throughout the literature. The effects of CON laws for substance use disorders, however, have received less attention than other types of CON laws. Using a theoretical model

highlighting relationships between supply restrictions and demand for treatments, we provide some of the first evidence on Medicaid patient outcomes under CON laws for SUD treatment facilities, as this population has higher SUD rates compared with the general population. We find that CON laws for SUD treatment facilities increase the SUD-related hospital bed utilization rate through both supply restrictions and short-run changes in demand. We also consider patient outcomes for children under these CON laws, specifically for infants with Neonatal Abstinence Syndrome who are born to parents with substance use disorders. We find that these laws increase the incidence of NAS births among this vulnerable population. Finally, we find that CON laws that restrict SUD treatment facilities, including the number of residential beds at these facilities, and significantly increase hospital emergency department utilization rates. If individuals were able to access care at an earlier stage of their substance use disorder, as in states without CON laws, fewer people would end up in the hospital system because they could receive treatment at an earlier stage. We also find more evidence that these laws disproportionately impact the most vulnerable groups in our society. Our results are robust to several specification checks, including a model of conditional mixed method endogeneity.

Reforms to CON laws could also save states tens of millions every year as well as helping to improve healthcare access and outcomes for households who rely on Medicaid insurance. Reforms to CON laws for SUD treatment facilities, therefore, represents an opportunity for states to provide better access to care for a vulnerable population that is often overlooked in the healthcare system, especially during the prevalent and ongoing substance use crisis.

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Appendix

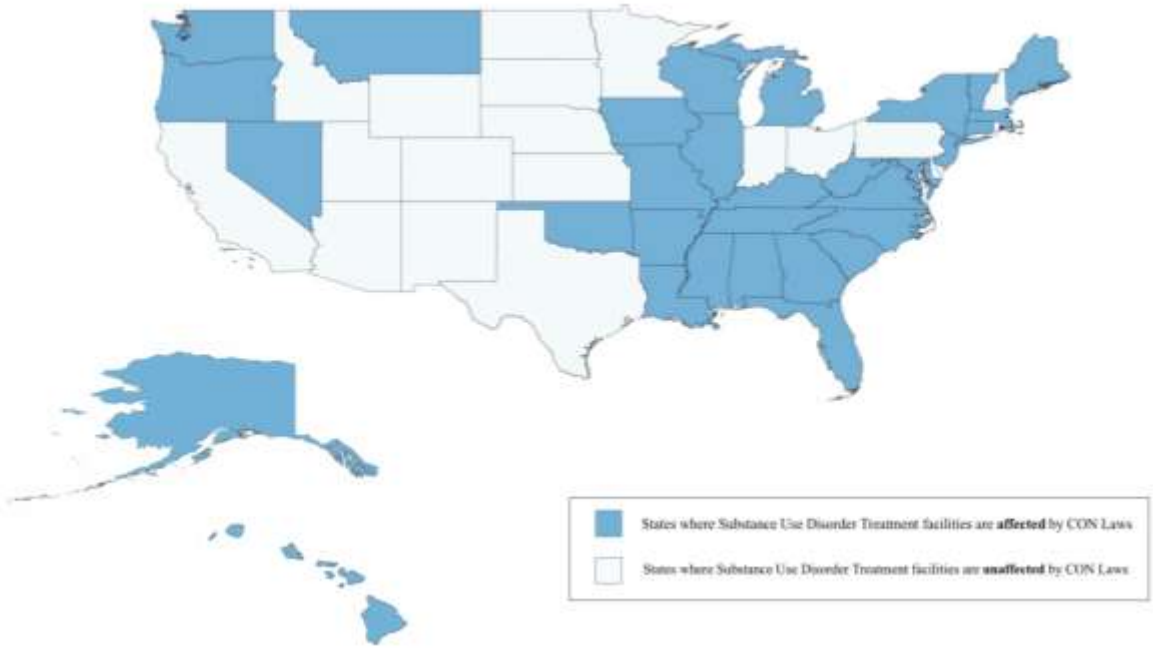

Figure 1. States Subject to Certificate-of-Need Related to Substance Use Disorder Treatment

Table 1. Summary Statistics of Key Variables

Variable	Mean	Standard Deviation	Minimum	Maximum
NAS Birth per 1000 Medicaid Births	19.624	16.647	1.99	77.29
Percent of Medicaid Emergency Department Visits for SUD-related Care	0.016	0.007	0.003	0.043
Hospital SUD Bed Utilization Rate	83.294	29.449	7.00	211.50
Residential SUD Bed Utilization Rate	91.410	17.287	53.00	163.10
Percentage of Facilities that Offer Diagnostic Services	0.907	0.061	0.672	1.000
Percent of Facilities that Offer Simultaneous SUD and Mental Health Treatment	0.591	0.128	0.299	0.875
Percent of Facilities that have a Contractual Referral Agreement with a Hospital In-Patient Emergency Care	0.156	0.061	0.054	0.374
Percent of Facilities that Accept Medicaid without Additional Payment Setup	0.731	0.152	0.280	0.952

Notes: Bed utilization rates may be greater than 100 percent, which may require the facility to borrow or assign patients to beds not denoted for SUD care. This may violate state capacity laws. These summary statistics are based on 200 observations, representing all 50 states across four years.

Table 2. Substance Use CON on Hospital and Residential Bed Utilization Rates

	Hospital Bed Utilization Rate			Residential Bed Utilization Rate		
	(1)	(2)	(3)	(1)	(2)	(3)
SUD CON	53.575***	67.092***	51.012***	1.300	-6.256	-0.266
	(16.707)	(19.387)	(24.058)	(9.409)	(11.251)	(13.810)
Proportion offering diagnostic services		144.184	138.041		-74.245	-74.348
		(105.840)	(105.876)		(60.860)	(60.951)
Proportion in Collaboration with a Hospital In-Patient Program			152.146			-58.655
			(135.033)			(78.166)
State	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Adj R2	0.45	0.45	0.45	0.41	0.41	0.41
Observations	192	192	192	200	200	200

Note: Two states, Colorado and Hawaii, do not report hospital bed utilization rates.

Table 3. Substance Use CON on Neonatal Abstinence Syndrome and Emergency Room Visits

	Neonatal Abstinence Syndrome per 1,000 Births			Emergency Room Visit for Substance Use Disorder per 1,000 Beneficiaries		
	(1)	(2)	(3)	(1)	(2)	(3)
SUD CON	8.750***	8.377***	10.928***	0.007***	0.008	0.016***
	(2.089)	(2.708)	(3.484)	(0.003)	(0.005)	(0.006)
Proportion offering diagnostic services		-3.676	-2.224		0.002	0.007
		(16.843)	(16.857)		(0.009)	(0.009)
Proportion which accepts Medicaid			10.024			-0.058**
			(8.654)			(0.023)
State	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Adj R2	0.97	0.97	0.98	0.83	0.83	0.84
Observations	144	144	144	141	141	141

Note: The Medicaid research group found that two states did not have reliable data for Neonatal Abstinence Syndrome among births and were not reported. Likewise, three states did not report emergency department visits related to substance use disorder.

Table 4. 3SLS for NAS and Hospital Bed SUD Utilization

	(1)	(2)	(3)
Simultaneous Equation 1	Hospital Bed Utilization		
Neonatal Abstinence Syndrome	-0.141	-0.083	-0.365
	(0.465)	(0.474)	(0.345)
SUD CON	19.091***	18.763***	19.983***
	(5.705)	(5.737)	(5.194)
Proportion offering diagnostic services	-0.864	-1.176	-6.621
	(18.330)	(18.260)	(17.862)
Proportion in Collaboration with a Hospital In-Patient Program			57.529
			(45.404)
Year FE	No	Yes	Yes
Simultaneous Equation 2	Neonatal Abstinence Syndrome		
Hospital Bed Utilization	0.201	0.201	0.101
	(0.165)	(0.165)	(0.128)
Proportion offering diagnostic services	-87.746***	-85.937***	-77.150***
	(23.777)	(24.070)	(20.620)
Proportion which accepts Medicaid			48.936***
			(9.562)
Year FE	No	Yes	Yes

Note: Hospital and residential bed utilization is collected from the National Survey of Substance Abuse Treatment Services and the national Mental Health Service Survey. Neonatal Abstinence Syndrome rates and Emergency Department utilization among the Medicaid population were collected from the Transformed Medicaid Statistical Information System.

Table 5. 3SLS for NAS and Residential Bed SUD Utilization

	(1)	(2)	(3)
Simultaneous Equation 1	Residential Bed Utilization		
Neonatal Abstinence Syndrome	-0.221	-0.230	-0.343*
	(0.238)	(0.242)	(0.205)
SUD CON	2.692	2.741	4.407
	(1.907)	(1.939)	(2.942)
Proportion offering diagnostic services	11.559	11.738	13.146
	(11.894)	(11.965)	(10.513)
Proportion in Collaboration with a Hospital In-Patient Program			-58.746**
			(29.439)
Year FE	No	Yes	Yes
Simultaneous Equation 2	Neonatal Abstinence Syndrome		
Hospital Bed Utilization	2.821	2.822	0.187***
	(4.069)	(4.026)	(0.071)
Proportion offering diagnostic services	-155.476	-157.125	-71.934***
	(95.718)	(97.324)	(19.376)
Proportion which accepts Medicaid			45.271***
			(7.964)
Year FE	No	Yes	Yes

Note: Hospital and residential bed utilization is collected from the National Survey of Substance Abuse Treatment Services and the national Mental Health Service Survey. Neonatal Abstinence Syndrome rates and Emergency Department utilization among the Medicaid population were collected from the Transformed Medicaid Statistical Information System.

Table 6. 3SLS for Emergency Department and Hospital Bed SUD Utilization

	(1)	(2)	(3)
Simultaneous Equation 1	Hospital Bed Utilization		
Emergency Department Visits Rate	-40.954	-35.254	-17.092*
	(41.374)	(30.570)	(10.326)
SUD CON	11.399*	11.383**	10.739**
	(6.151)	(5.300)	(4.396)
Proportion offering diagnostic services	-35.073	-33.309	-25.929
	(28.026)	(22.939)	(17.399)
Proportion in Collaboration with a Hospital In-Patient Program			24.277
			(42.407)
Year FE	No	Yes	Yes
Simultaneous Equation 2	Emergency Department		
Hospital Bed Utilization	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Proportion offering diagnostic services	0.020	0.022	0.020
	(0.015)	(0.015)	(0.013)
Proportion which accepts Medicaid			0.017***
			(0.005)
Year FE	No	Yes	Yes

Note: Hospital and residential bed utilization is collected from the National Survey of Substance Abuse Treatment Services and the national Mental Health Service Survey. Neonatal Abstinence Syndrome rates and Emergency Department utilization among the Medicaid population were collected from the Transformed Medicaid Statistical Information System.

Table 7. 3SLS for Emergency Department and Residential Bed SUD Utilization

	(1)	(2)	(3)
Simultaneous Equation 1	Residential Bed Utilization		
Emergency Department Visit Rate	-15.416	-3.044	-1.181
	(36.954)	(2.086)	(5.775)
SUD CON	0.669	1.362	1.244
	(1.857)	(2.194)	(2.229)
Proportion offering diagnostic services	14.088	21.729*	23.633**
	(21.736)	(12.582)	(9.441)
Proportion in Collaboration with a Hospital In-Patient Program			-16.028
			(21.836)
Year FE	No	Yes	Yes
Simultaneous Equation 2	Emergency Department		
Hospital Bed Utilization	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Proportion offering diagnostic services	0.005	0.009	0.013
	(0.012)	(0.010)	(0.009)
Proportion which accepts Medicaid			0.016***
			(0.004)
Year FE	No	Yes	Yes

Note: Hospital and residential bed utilization is collected from the National Survey of Substance Abuse Treatment Services and the national Mental Health Service Survey. Neonatal Abstinence Syndrome rates and Emergency Department utilization among the Medicaid population were collected from the Transformed Medicaid Statistical Information System.

Table 8. Conditional Mixed Process Endogeneity Correction for Simultaneous Equations

	(1)	(2)	(3)	(4)
Recursive Equation 1	Hospital Bed Utilization	Hospital Bed Utilization	Residential Bed Utilization	Residential Bed Utilization
Neonatal Abstinence Syndrome	-0.665*		-0.231	
	(0.396)		(0.282)	
Emergency Department Visit Rate		-16.003		-4.813
		(13.287)		(8.899)
SUD CON	20.733***	8.630*	3.863	1.668
	(5.119)	(4.788)	(2.637)	(3.066)
Proportion offering diagnostic services	-49.725	-39.679	6.856	-3.980
	(50.178)	(44.960)	(32.578)	(26.984)
Proportion in Collaboration with a Hospital In-Patient Program	37.826	52.856	-37.959*	-15.339
	(47.407)	(38.543)	(35.386)	(28.261)
Year FE	Yes	Yes	Yes	Yes
Recursive Equation 2	Neonatal Abstinence Syndrome	Emergency Department	Neonatal Abstinence Syndrome	Emergency Department
Hospital Bed Utilization	0.191	0.000	1.641	-0.000
	(0.160)	(0.000)	(1.285)	(0.000)
Proportion offering diagnostic services	-76.760***	0.0143	-111.176***	0.014
	(21.593)	(0.014)	(42.469)	(0.012)
Proportion which accepts Medicaid	50.939***	0.014**	50.239***	0.014***
	(10.288)	(0.006)	(15.786)	(0.004)
Year FE	Yes	Yes	Yes	Yes

Note: Hospital and residential bed utilization is collected from the National Survey of Substance Abuse Treatment Services and the national Mental Health Service Survey. Neonatal Abstinence Syndrome rates and Emergency Department utilization among the Medicaid population were collected from the Transformed Medicaid Statistical Information System. Table 8 differs from the previous 3SLS tables by instead allowing equations to be simultaneous within conditional mixed method endogeneity.

Table 9. Robustness to ACA Medicaid Expansions for 3SLS

	(1)	(2)	(3)	(4)
Simultaneous Equation 1	Hospital Bed Utilization	Hospital Bed Utilization	Residential Bed Utilization	Residential Bed Utilization
Neonatal Abstinence Syndrome	-0.393		-0.306	
	(0.347)		(0.193)	
Emergency Department Visit Rate		-17.583		-2.581
		(11.467)		(6.158)
SUD CON	20.826***	10.858**	6.301**	1.596
	(5.670)	(4.600)	(2.853)	(2.272)
Proportion offering diagnostic services	-0.461	-27.979	13.159	23.420**
	(17.296)	(17.616)	(9.474)	(9.454)
Proportion in Collaboration with a Hospital In-Patient Program	39.388	19.817	-39.935	-15.264
	(42.304)	(42.321)	(26.424)	(21.465)
ACA Medicaid Expansion	-2.323	0.274	9.804***	3.368
	(5.864)	(5.459)	(3.424)	(2.836)
Year FE	Yes	Yes	Yes	Yes
Simultaneous Equation 2	Neonatal Abstinence Syndrome	Emergency Department	Neonatal Abstinence Syndrome	Emergency Department
Hospital Bed Utilization	0.214	0.000	1.145*	-0.000
	(0.142)	(0.000)	(0.651)	(0.000)
Proportion offering diagnostic services	-90.18***	0.020	-108.597***	0.013
	(20.528)	(0.013)	(25.026)	(0.008)
Proportion which accepts Medicaid	44.998***	0.017***	46.152***	0.014***
	(9.474)	(0.005)	(11.253)	(0.004)
ACA Medicaid Expansions	10.511***	0.002	1.271	0.002
	(2.936)	(0.001)	(5.653)	(0.001)
Year FE	Yes	Yes	Yes	Yes

Note: Hospital and residential bed utilization is collected from the National Survey of Substance Abuse Treatment Services and the national Mental Health Service Survey. Neonatal Abstinence Syndrome rates and Emergency Department utilization among the Medicaid population were collected from the Transformed Medicaid Statistical Information System.