I Z A Institute
of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 10478

Health Insurance Expansions and Provider Behavior: Evidence from Substance Use Disorder Providers

Johanna Catherine Maclean
Ioana Popovici
Elisheva Rachel Stern

JANUARY 2017

I Z A Institute
of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 10478

Health Insurance Expansions and Provider Behavior: Evidence from Substance Use Disorder Providers

Johanna Catherine Maclean
Temple University, NBER and IZA

Ioana Popovici
Nova Southeastern University

Elisheva Rachel Stern
Temple University

JANUARY 2017

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Health Insurance Expansions and Provider Behavior: Evidence from Substance Use Disorder Providers*

We examine how substance use disorder (SUD) treatment providers respond to private health insurance expansions induced by state equal coverage ('parity') laws for SUD treatment. We use data on the near universe of specialty SUD treatment providers in the United States between 1997 and 2010 in an event study analysis. During this period, 18 states implemented parity laws. Following the passage of a state parity law we find that providers are less likely to participate in public markets, are less likely to provide charity care, increase the quantity of healthcare provided, and become more selective of the type of patients they are willing to admit.

JEL Classification: I1, I11, I18

Keywords: healthcare, provider behavior, substance use disorders, health insurance mandates

Corresponding author:
Johanna Catherine Maclean
Department of Economics
Temple University
1301 Cecil B. Moore Ave
Philadelphia, PA 19122
USA

E-mail: catherine.maclean@temple.edu

* We thank David Bradford, Dhaval Dave, Jason Hokenberry, Michael Pesko, Brendan Saloner, Douglas Webber, and seminar participants at the 2015 Association for Public Policy and Management Conference in Miami Florida, 2016 American Society of Health Economists Conference in Philadelphia PA, the 2016 Annual Health Economics Conference, Cornell Medical College, and Lehigh University for helpful suggestions. All errors are our own.

I. Introduction

Standard economic models (Sloan, Mitchell et al. 1978) suggest that state-level equal coverage ('parity') laws for substance use disorder (SUD) treatment in private insurance plans can induce changes in the insurance markets in which providers participate as well as the quantity and intensity of treatment provided. In this study we test these predictions by examining how SUD treatment providers respond to expansions in private health insurance coverage for SUD treatment attributable to parity laws.

There are several reasons why understanding factors that affect SUD treatment provision is important beyond simply testing the predictive power of economic models in real world healthcare markets. These reasons relate to the financial and non-financial costs SUDs impose on society. In terms of direct financial costs, the U.S. spends nearly $27B per year on SUD treatment, the majority (69%) of which is financed by public payers (Substance Abuse and Mental Health Services Administration 2013).[1] The full costs of SUDs extend beyond financial costs of addiction treatment, however. For example, SUDs are linked with morbidity and mortality (Carpenter and Dobkin 2009, Carpenter and Dobkin 2011), increased use of general healthcare (Balsa, French et al. 2009), employment problems (Terza 2002), crime (Carpenter 2007), and traffic accidents (Adams, Blackburn et al. 2012). Not surprisingly, the total annual economic costs of SUDs in the U.S. are large: $516B (Caulkins, Kasunic et al. 2014).[2]

Although SUDs place a great burden on both the affected individual and society, treatment has been shown to reduce SUDs and their associated harms among treated patients (Rajkumar and French 1997, Lu and McGuire 2002, Stewart, Gossop et al. 2002, Kunz, French et al. 2004, Reuter and Pollack 2006, Popovici and French 2013, Swensen 2015, Bondurant,

[1] The authors used the Consumer Price Index to inflate the original estimate ($24B in 2009 dollars) to 2016 dollars.
[2] The authors used the Consumer Price Index to inflate the original estimate ($481B in 2011 dollars) to 2016 dollars.

Lindo et al. 2016). Thus, understanding how SUD providers respond to changes in treatment coverage, such as those induced by health insurance expansions, is important for promoting public health and minimizing social costs.

To study this question, we use data on specialty SUD treatment providers in the U.S. between 1997 and 2010. Over this time period, 18 states implemented SUD parity legislation, offering a quasi-experiment with which to study parity impacts on the supply side of treatment. Using an event study design, we examine provider response along several margins: participation in specific insurance markets, charity care provision, treatment quantity, and cream-skimming.

Our findings suggest that SUD providers alter their care practices following the implementation of state SUD treatment parity law. Following passage of parity laws, providers are less likely to participate in public insurance markets, are less likely to provide charity care, and increase the quantity of healthcare provided. We find that providers may become more selective of the type of patients they admit following passage of a parity law: providers admit a higher share of patients who are *ex ante* more likely to respond favorably to treatment.

This manuscript is organized as follows: Section 2 describes state-level SUD treatment parity laws and related literature. Section 3 outlines the conceptual framework that guides our empirical analysis. Data, variables, and methods are outlined in Section 4. In Section 5 we present our main findings and Section 6 reports robustness checks. Section 7 concludes.

2. Background and related literature

In this section, we first discuss government efforts to regulate SUD treatment services in private health insurance markets. Second, we briefly review the related literature.

2.1. Government efforts to expand SUD treatment coverage in private insurance markets

Historically SUD treatment benefits have been covered less favorably than physical health benefits in private health insurance plans (Starr 2002).[3] Both Federal and state governments have attempted to address this coverage disparity.

The Federal government has implemented two key coverage changes. First, the 2008 Mental Health Parity and Addiction Equity Act (MHPAEA) became effective in 2010. MHPAEA prohibits differences in treatment limits and cost-sharing and extends coverage requirements to SUD treatment services in a range of public and private health insurance plans (Medicaid, Medicare, group and individual private plans). However, the Act does not mandate that plans provide SUD coverage; rather it regulates coverage generosity among plans that do cover SUD services. Second, the ACA, effective January 1st 2014, lists coverage for SUD treatment as one of ten required benefits for private insurance offered for sale on online health insurance exchange marketplaces and individuals newly insured through expanded Medicaid programs. This Act extends MHPAEA by mandating equal coverage for SUD treatment in all affected plans rather than requiring parity only for plans that offer SUD benefits.

States have also attempted to address less generous coverage for SUD treatment in private markets by mandating coverage for such services. Massachusetts was the first state to pass a parity law in 1974 (National Council of State Legislatures 2015).

Although there is substantial heterogeneity in states' regulatory efforts, these laws can be broadly classified into three categories (National Council of State Legislatures 2015). First, 'full parity' laws prohibit private insurers from discriminating between coverage for SUD treatment and physical disorders. That is, full parity laws mandate that private insurers provide the same

[3] Public insurance coverage has historically been less generous as well.

level of benefits for SUD treatment as for other physical disorders in terms of visit limits, cost-sharing (deductibles, co-payments, etc.), and lifetime and annual service limits. Second, 'mandated benefit' laws require that some minimum level of coverage for SUD treatment be provided. These laws are not considered full parity as they permit discrepancies between the level of benefits provided for SUD treatment and physical health treatment. Third, 'mandated offering' laws come in two forms: (i) require that an option of SUD treatment be provided to the insured (this option can be accepted or rejected by the insured individual and, if accepted, the insurance contract typically requires a higher premium for SUD treatment) or (ii) require that – if SUD benefits are offered – they must be equal to physical disorder benefits. In general, full parity is considered the strongest type of regulation followed by mandated benefit and then mandated offer. For brevity, we refer to state laws that regulate coverage of SUD treatment – to any extent – in private health insurance markets as 'parity laws'.

2.2. Evidence from previous private health insurance expansions studies

Recent studies have relied on four regulatory changes to study the effect of health insurance expansions on SUD treatment use:[4] (i) the 2006 Massachusetts healthcare reform (which increases private and public insurance coverage), (ii) the ACA 2010 dependent coverage provision (which requires that many private insurers offer coverage to dependent children of beneficiaries through the child's 26th birthday), (iii) MHPAEA, and (iv) state parity laws.

Meara, Golberstein et al. (2014) examine changes in inpatient hospital care among young adults after the 2006 healthcare reform law in Massachusetts. The authors find declines in SUD-related emergency department use and inpatient hospitalizations, which could be attributable to expanded access to SUD treatment services in other settings (e.g. outpatient).

[4] There are numerous studies that examine individual decisions to obtain health insurance, but we focus our attention here on studies that examine changes in Federal or state laws as they are most comparable to our analysis.

Golberstein, Busch et al. (2015) document that the ACA dependent coverage provision leads to an increase in psychiatric admissions to hospitals, with SUD admissions accounting for the largest share of this increase. However, Saloner and Cook (2014) find that the provision has no effect on SUD treatment use in the National Survey of Drug Use and Health (NSDUH). Akosa Antwi, Moriya et al. (2015) document that SUD hospital admissions among young adults, relative to a sample of slightly older adults, are not appreciably impacted by this provision. Finally, Saloner, Akosa et al. (2016) use a national database of specialty SUD treatment admissions to study dependent coverage provision effects. The provision decreases admissions which could suggest that it allowed patients to receive care in other settings.

Busch, Epstein et al. (2014) and McGinty, Busch et al. (2015) use insurance claims to examine the effect of MHPAEA. Findings from these studies suggest a modest impact of MHPAEA on SUD treatment use overall, but increases in the use of out-of-network services.[5]

Several recent studies use variation in insurance coverage for SUD treatment generated by state parity laws. Dave and Mukerjee (2011) show that parity laws not only increase the number of admissions to SUD treatment but also the fraction of clients using private insurance to pay for treatment. Wen, Cummings et al. (2013) and Wen, Hockenberry et al. (2014) find that state parity laws increase admissions using the National Survey of Substance Abuse Treatment Services, the same data set we employ here.

To the best of our knowledge, only one study has examined how the supply side of SUD treatment reacts to private insurance coverage expansions.[6] Maclean and Saloner (2016)

[5] However, access to out-of-network services is particularly important in the context of SUD treatment as many networks do not offer adequate access to specialists providers such as addiction treatment providers.

[6] A handful of papers document that public health insurance (i.e., Medicaid) expansions may induce providers to adopt new technologies (Clemens 2013, Freedman, Lin et al. 2015). In a recent paper, Buchmueller, Miller et al. (2016) examine how dentists respond to Medicaid expansions. Dentists' participation in the Medicaid market increased and that dentists used substitutes (i.e., hygienists) more intensely following an expansion.

examine SUD treatment provider response to the 2006 Massachusetts healthcare reform. The authors find little evidence that the reform affected market participation, provision of charity care, or the quantity of healthcare provided. However, the reform altered treatment intensity in terms of offered services and programs for special populations. The authors note that the Massachusetts reform occurred within a state that had a very low uninsurance rate, thus the reform may have had little bite on providers' care practices.

3. Conceptual framework

The starting point for our empirical analysis is the Sloan, Mitchell et al. (1978) mixed economy model. Although the Sloan model was developed in the context, and has been primarily applied to analyses, of state Medicaid programs (Sloan, Mitchell et al. 1978, Baker and Royalty 2000, Garthwaite 2012, Buchmueller, Miller et al. 2016), it offers predictions for private insurance market changes; see Table 1 in Sloan, Mitchell et al. (1978).

In the Sloan model healthcare providers are hypothesized to operate in a healthcare market with two types of insured patients – the privately insured and the publicly insured – and uninsured patients. The privately insured are assumed to offer higher reimbursement rates than the publically insured. In turn, uninsured patients are charged lower prices for healthcare services than either type of insured patient. Providers first choose to treat privately insured patients. Providers continue to accept privately insured patients until the marginal revenue from these patients equals the government-determined fixed payment for the publicly insured patients. After this point, providers will accept Medicaid patients. Finally, once all privately and Medicaid patients are treated, providers will accept uninsured patients.[7] The Sloan model

[7] An assumption of the Sloan model is that uninsured patients are less profitable than insured patients. To the best of our knowledge this question has not been explored within the SUD treatment delivery system. However, there is some evidence that the uninsured may in fact be more profitable than the insured in the context of general healthcare (Anderson 2007, Melnick and Fonkych 2008, Richman , Hall et al. 2012, Dusetzina, Basch et al. 2015, Saloner,

assumes that healthcare providers offer a homogenous healthcare service. In our context this service is a specialty SUD treatment admission.

Figure 1 graphically depicts the Sloan model. The marginal revenue curve faced by the provider is kinked. The leftmost downward sloping segment of the marginal review curve, MR_p, captures the private market. The horizontal segment of this curve, MR_m, captures the Medicaid (public) market. Finally, the rightmost downward sloping segment of the marginal revenue curve (MR_u) captures the uninsured market.

Where a healthcare provider chooses to operate – that is his mix of private, Medicaid, and uninsured patients – is determined by his marginal cost curve. In Figure 1 providers with marginal cost curves MC_1 will treat only privately insured patients while providers with marginal cost curves MC_2 and MC_3 will treat a mix of privately and Medicaid insured patients. Finally, providers operating with marginal cost curve MC_4 will treat patients in all three markets (private, Medicaid, as well as uninsured patients).

In our study, we explore how, all else equal, providers respond to changes in the share of the private health insurance market that covers SUD treatment services. In the context of the Sloan model, a state parity law in the private health insurance market can be depicted as an outward rotation in the MR_p segment of the marginal revenue curve to MR_p'. That is, a larger share of the privately insured now has access to SUD treatment benefits.[8] We assume for simplicity that individuals who gain private insurance coverage for SUD treatment services through the expansion have, on average, comparable SUDs and preferences as those individuals

Polsky et al. 2015). If the uninsured are more profitable than the insured, then we would not expect providers to shift away from the uninsured market following a private health insurance market, at least as a first order effect.

[8] Basic demand theory implies that a decrease in price should increase the quantity demanded, while changes in the market size should lead to a change in demand. We focus on the latter change here: an increase in the market size.

who had private coverage for these services prior to the expansion.[9] Relatedly, as the private insurance market expands, the uninsured market declines (those individuals who gain private coverage for SUD treatment services in our context held private insurance that did not cover these services prior to the expansion). Thus, the uninsured portion of the marginal revenue curve (MR_u) should rotate inward to MR_u'. There is no change in the size of the public market (MR_m).

The impact of this expansion on healthcare providers' mix of patients and quantity of services is predicated on where the marginal cost curves of providers are located prior to the expansion of private coverage for SUD treatment services. Specifically, providers with marginal cost curve MC_1 who treated only privately insured patients in the pre-expansion period will continue to participate in the private market only, but will increase the quantity of services they provide (Q_1 to Q_2). Providers with marginal costs curves MC_2 will increase the share of privately insured patients, indeed they will leave the public market entirely, and increase the quantity of services provided (Q_3 to Q_4). Providers with marginal cost curves MC_3 – participate in the private and Medicaid market in the pre-expansion period – will shift their patient mix toward privately insured patients, but will continue to participate in both the private and public market and provide the same quantity of healthcare post-expansion. Finally, providers with marginal cost curve MC_4, who participate in all three markets pre-expansion, exit the uninsured market, and increase quantity (Q_6 to Q_7).

[9] It may be that individuals who hold private health insurance coverage contracts that are compelled to provide SUD treatment services through state mandates are different, particularly in terms of the prevalence or severity of SUDs, than comparable individuals who had private coverage for these services prior to the expansion. To the best of our knowledge, there is no evidence on this question, although Busch, Meara et al. (2013) show that individuals who gain access to Medicaid insurance through the ACA have somewhat higher SUD prevalence rates than individuals holding Medicaid insurance prior to this expansion. These findings suggest that there may be differences in SUD treatment needs, and therefore in marginal cost of treatment, between those individuals gaining insurance through state parity laws and those individuals previously holding private insurance. If the newly insured are more costly than the previously insured, this higher marginal cost would offset some of the benefit in terms of their higher reimbursement rate (i.e., marginal revenue).

Thus, the Sloan model leads to several market level predictions regarding the impact of a private health insurance expansion for SUD treatment services.

H1: Patient mix will shift toward the privately insured.

H2: Patient mix will shift away from the uninsured.[10]

H3: The quantity of healthcare services will increase.

The effect of parity laws on provider participation in the Medicaid market is ambiguous as the effect will be determined by the responses of providers with marginal cost curves MC_2 and MC_4 to the private market expansion.

The discussion thus far has assumed that the populations covered by specific insurance plans and those uninsured will remain stable following the passage of the parity law. However, if instead individuals previously insured through Medicaid substitute private for public insurance ('crowd-in'[11]) then the MR_p will rotate farther outward and the MR_m segment of the marginal revenue curve will shrink. Similarly, if previously uninsured individuals take up private insurance to gain access to the newly covered benefits, this behavior will lead to an additional outward rotation of the MR_p segment and the MR_u segment will rotate farther inward.

The Sloan model does not offer a clear prediction for the provision of charity care (Chen 2014). However, previous research has documented that financial incentives effect the level of charity care that providers deliver: Chen (2014) documents that as Medicaid reimbursement levels increase, physicians reduce the amount of charity care provided.[12] Parity laws may

[10] However, as discussed in footnote 7, if the uninsured are charged higher rates that the insured, then we hypothesize no change in providers' participation in the uninsured market.

[11] The term 'crowd out' is often used within the economics literature to refer to a situation in which an expansion of public insurance induces individuals to drop private insurance and take up public insurance (Cutler and Gruber 1996). We use the term 'crowd in' to denote the opposite behavior.

[12] Chen (2014) develops a physician supply model in which Medicaid reimbursement rates have two effects: income effects and substitute effects. Income effects increase a physician's supply of charity care while substitution effects decrease the supply of charity care, leaving the net effect ambiguous.

impose similar incentives on providers: these laws increase the share of higher reimbursement rate private patients in the market. We will explore the impact of parity laws on charity care.

Features of the SUD treatment delivery system may mute providers' response to state parity laws. First, many providers lack the administrative capacity (e.g., electronic billing systems) necessary to bill insurance (Buck 2011), which may limit their ability to accept private insurance. Second, the number of individuals affected by state parity laws may be too small to induce a response: 33% to 42% of the population (Jensen and Morrisey 1999). Third, SUD treatment need is greater than use: 1.5% of the adult population received SUD treatment in 2013 while 8.2% was classified as suffering from an SUD (Substance Abuse and Mental Health Services Administration 2014).[13] Thus, treatment need outpaces treatment receipt (i.e., excess demand) and providers may have limited incentive to respond to changes in private coverage.

4. Data and methods

4.1. National Survey of Substance Abuse Treatment Services (N-SSATS)

We use the N-SSATS as our primary source of data. These data provide information on all providers known to the Substance Abuse and Mental Health Services Administration (SAMHSA) that offered specialty SUD treatment between 1997 and 2014. SAMHSA defines a specialty SUD treatment facility as a hospital, a residential facility, an outpatient treatment facility, or other facility with an SUD treatment program that offers the following services: (i) outpatient, inpatient, or residential/rehabilitation treatment; (ii) detoxification; (iii) opioid treatment; and (iv) halfway-house services. We focus on years 1997-2010.[14] We truncate the

[13] We note that treatment need is not an ideal measure of demand for treatment. Some individuals who display patterns of substance use that healthcare professionals believe require treatment likely do not wish to receive such treatment. However, to the best of our knowledge, there is no systematic data on demand for SUD treatment.
[14] The N-SSATS has undergone several major survey re-designs. Due to these survey re-designs no data are available for 1999 or 2001. If we extend our study period through 2012 our findings are not appreciably changed. The N-SSATS underwent another major change in 2013 and several of our variables are no longer available.

sample in 2010 as MHPAEA became effective in early 2010 and this Federal law supersedes the state laws we examine here (Dave and Mukerjee 2011). Moreover, early provisions of the ACA became effective in 2010 (Tello-Trillo 2016) and several states expanded Medicaid in advance of the ACA between 2010 and 2011 (Sommers, Arntson et al. 2013).

The N-SSATS data provide a 'snap shot' of one day of a provider's operations, where a provider is a facility that delivers specialty SUD treatment services. Between 1997 and 2000 the survey day is near the end of September, and the end of March thereafter. N-SSATS administrators send a survey to all known specialty SUD providers each year. A staff member familiar with the provider's operations completes the survey. Over our study period the N-SSATS response rates were over 85%.[15] The N-SSATS is an unbalanced panel of providers and our analysis data set consists of 157,989 provider/year observations. Due do missingness patterns, our sample sizes vary to some extent across regressions.[16]

4.2. State parity laws

Our source of variation in our empirical models is changes in state parity laws between 1997 and 2010. We use information on state parity laws maintained by the National Council of State Legislatures (2015) and our own reading of the original state statutes.[17] As noted earlier in the manuscript, state regulations of SUD treatment in private health insurance plans can be categorized into three broad groups: (i) full parity, (ii) mandated benefits, and (iii) mandated offer. Several states implemented what we refer to as 'weak' parity laws: laws that extend full parity to specific groups (e.g., state employees). We code these laws as mandated offer.

[15] Providers who do not complete the N-SSATS survey are not listed on the SAMHSA inventory of treatment facilities, which is commonly used as a source to locate providers by patients and providers. Thus, the costs of not completing the survey are relatively high.
[16] Results are not appreciably different if we instead exclude observations with missing outcomes.
[17] All three authors, and several research assistants, reviewed the coding scheme. More details are available from the corresponding author.

During our study period eighteen states implemented a state parity law: seven states (Connecticut, Delaware, Maryland, Minnesota, Oklahoma, Virginia, and West Virginia) implemented full parity, six states (Alaska, Indiana, Kansas, Oregon, Tennessee, and Texas) implemented a minimum mandated benefit law, and five states (Colorado, Georgia, Louisiana, New Mexico, and Utah) implemented a mandated offer law.

States that adopted parity laws before and after our study period do not offer variation in our empirical models. All adopting states and the law effective dates are presented in Table 1. We match law effective dates to the N-SSATS survey day and thus our coding departs from the actual effective date for some states. For example, while Alaska passed a mandated benefit law in July 2004 this law would not affect the N-SSATS outcomes in 2004 as the survey was fielded at the end of March (before the law effective date). We include a third column in Table 1 that indicates the relevant 'effective' year in the N-SSATS data. For Alaska this year is 2005.

We construct two variables based on the parity laws: (i) an indicator of any law (full parity, mandated benefits, or mandated offer) and (ii) an indicator of a 'strong' law (full parity or mandated benefits). These laws may affect specific groups of insurance contracts (e.g., group only) or the full population of privately insured.[18] We chose not to report results for full parity as such models would rely on just seven 'changer' states for identification and, as described in the next section, a sub-set of our outcome variables are only available 2000-2010, further reducing the number of changer states to just one state (West Virginia in 2002).

A feature of our study period that is important for interpreting our findings is that we identify treatment effects off (at most) 18 changer states. While changer states vary in terms of

[18] Over our study period group plans represent a large majority of the private market based on our analysis of the Annual Social and Economic Supplement to the Current Population Survey. Therefore, we expect that laws affecting the group market only impact a substantial share of the private market.

geography, size, income, demographics, and social and political norms, they may not be representative of other states. However, in unreported analyses, we compared demographic information in the Annual Social and Economic Supplement to the Current Population Survey (ASEC) 1997-2010 (excluding 1999 and 2001) for the 18 changer states and all other states. Results suggest that the two groups are similar across these observable characteristics.

4.3. Outcome variables

We consider a range of possible margins along which specialty SUD treatment providers may respond to changes in coverage for SUD treatment as predicted by our conceptual framework. First, we examine accepted forms of payment: private insurance, public insurance (Medicaid, Medicare, other state financed),[19] and self-payment ('uninsured'). These variables proxy for the provider's participation in these particular insurance markets. Ideally, we would like to know the share of patients treated within these specific markets, but our dataset does not contain this information. We also consider the provision of discounted or free care to the uninsured as measured by acceptance of a sliding-fee-scale (that is, the facility offers lower fees to clients with lower incomes), other payment assistance programs, and provision of free care ('charity care'). Payment and charity care variables were added to the N-SSATS in 2000, thus we can only study these outcomes for the period 2000 to 2010.

Second, we examine measures of treatment quantity: annual admissions (although N-SSATS provides a snap shot of one day of a provider's operations, the survey asks for an estimate of annual admissions) and total number of clients receiving treatment on the survey day.

[19]Although the Sloan, Mitchell et al. (1978) model focuses on Medicaid, for brevity we group all public insurance forms together in our main analysis although we report results from regressions that consider these insurance forms separately in supplementary analyses. In general, public insurance offers lower reimbursement rates than private insurance, thus we believe it is reasonable to combine public insurance forms. Moreover, we are concerned that there may be some mis-reporting of insurance acceptance by providers, this type of reporting error has been documented among individuals in survey settings (Lo Sasso and Buchmueller 2004, Kolstad and Kowalski 2012).

4.4. Control variables

We merge several state-level variables into the N-SSATS to control for state characteristics in our regression models. Our objective is to include variables that are correlated with both the passage of a state parity law and our outcome variables, and therefore to minimize omitted variable bias. First, we merge in the share of the population that is employed by a small firm, defined as less than 100 employees (Kaestner and Simon 2002), from the ASEC. Larger firms are more likely to self-insure and thus be exempt from state SUD parity laws (Jensen and Morrisey 1999, Kaiser Family Foundation 2014). Controlling for the share of workers employed at small firms allows us to condition on the proportion of workers in a state whose insurance plans are potentially impacted by state parity laws. We return to this issue more formally later.

Second, we merge state-year level demographic variables (sex, age, race, ethnicity, marital status, education, family income) from the ASEC into the N-SSATS. Third, we include variables that potentially proxy state preferences towards substance use and addiction treatment: the state beer tax per gallon from the Brewers' Almanac (The Beer Institute 2012), an indicator for marijuana decriminalization (Pacula, Chriqui et al. 2003),[20] an indicator for legalization of medical marijuana (Pacula, Powell et al. 2015), and annual funding from the Substance Abuse Prevention and Treatment (SAPT) block grant program (obtained from SAMHSA).[21]

Ideally, we would like to control for the generosity of the state Medicaid program in terms of coverage for SUD treatment in our regression models. However, to the best of our knowledge, there is no uniform data on state Medicaid coverage of SUD treatment for our entire study period. Thus, we control for income eligibility for each states' Medicaid program for a

[20] We thank Rosalie Pacula for sharing updated marijuana decriminalization data with us.
[21] We thank Brooklyn Lupari at SAMHSA for providing these data to us.

family of three (Hamersma 2013)[22] and Health Insurance Flexibility and Accountability (HIFA) waivers that cover SUD treatment (Wen, Hockenberry et al. 2014). HIFA waivers extend coverage to individuals who did not fall within traditional Medicaid categories, specifically the waivers target low income adults who are nondisabled, childless, or from qualified poor families.

We control for several social policies from the University of Kentucky Center for Poverty Research (2015): the effective state minimum wage, maximum Temporary Assistance for Needy Families (TANF) benefit for a family of four, the maximum Supplementary Nutrition Assistance Program (SNAP) benefit for a family of four, and the state Earned Income Tax Credit (EITC) as a proportion of the federal EITC. We also include an indicator for a Democratic Governor. We include the share of the adult population that reports fair or poor health using data drawn the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance Survey to proxy health status.[23] Finally, we include the state population from the U.S. Census Bureau to control for differences in populations potentially seeking treatment. We inflate all monetary values to 2010 using the Consumer Price Index.

We also include provider-level control variables in our regression model. Specifically, we include indicators for primary focus, whether the provider is a solo practitioner, ownership status, whether the provider's facility is located within a hospital, and whether the provider receives government financing (not including public insurance payments).

[22] We are grateful to Sarah Hamersma for kindly sharing Medicaid income eligibility with us. The data are available at the quarterly level. We match the Medicaid income data to N-SSATS using the 4th quarter information between 1997 and 2000, and the 1st quarter information between 2002 and 2010.

[23] One may be concerned the self-reported health is endogenous in the regression model (i.e., influenced by state parity laws). We have removed this variable from the regression model. Results are not appreciably different.

4.5. Empirical model

We estimate the relationship between state parity laws on SUD provider outcomes with the following event study regression model:

(1) $$Y_{ist} = \beta_0 + \sum_e \delta_e L_{st}^e + \beta_1' X_{st} + \beta_2' P_{ist} + S_S + \tau_t + \mu_{ist}$$

Y_{ist} is a measure of specialty SUD treatment for provider *i* in state *s* in year *t*. The L_{st}^e are a series of 'event time' indicators, where the event is the passage of the state parity law. The indicators take on a value of one if the event is *e* periods away and zero otherwise. We follow Kline (2011) and impose 'end point' restrictions. We include the following indicators in event time: seven or more years pre-event, six to five years pre-event, four to three years pre-event, event year, one to two years post-event, three to four years post-event, five to six years post-event, and seven or more years post-event, thus the omitted category is the two to one years prior to the event. Results are not appreciably different if we apply alternative end point restrictions.

X_{st} is a vector of state demographics and policies, and P_{ist} is a vector of provider characteristics. S_s and τ_t are vectors of state and year fixed effects.[24] ε_{ist} is the error term. We cluster standard errors around the state.[25] We estimate regressions using linear probability models (LPM) when the outcome is binary and OLS when the outcome is continuous; however results are robust to using alternative models (e.g., probit, Poisson).

We chose to rely on an event study design as we are concerned that states, alarmed with increasing problems associated with SUDs, may implement parity laws rather than parity laws leading to changes in SUD-related outcomes. The event study, through the inclusion of policy

[24] We do not include state-specific time trends in the regression model. Including such variables in an event study model may muddle interpretation of the coefficient estimates on the leads and lags (Wolfers 2006).
[25]The N-SSATS includes all states in all years and we have 51 clusters (Cameron and Miller 2015).

leads, can account for such reverse causality and allow us to recover causal estimates. Moreover, the use of policy lags allows us to study dynamics in treatment effects.

5. Results

5.1 Descriptive analysis of patients receiving SUD treatment in specialty facilities

Before proceeding to our analysis of the effect of state parity laws on SUD treatment provider behavior, we first offer a descriptive analysis of the characteristics of patients receiving specialty SUD treatment. To this end, we turn to the Treatment Episode Data Set (TEDS) as the N-SSATS has very limited information on patient characteristics.[26] TEDS is an administrative database compiled annually by the U.S. government in collaboration with state substance abuse agencies. The TEDS dataset includes information on approximately 2 million admissions to specialty SUD treatment each year, and contains nearly the universe of specialty SUD treatment facilities that receive financing from the state or federal government, are certified by the state to provide specialty SUD treatment, or are tracked for some other reason.

The TEDS are commonly employed within the economics literature to study SUD treatment (Anderson 2010, Dave and Mukerjee 2011, Jena and Goldman 2011, Pacula, Powell et al. 2013) and are utilized by the Federal government to estimate the costs of SUD treatment to the U.S. economy (Office of National Drug Control Policy 2012). We aggregate the TEDS to the state-year level. We report the demographic characteristics of this population in Table 2.

Patients receiving treatment in TEDS facilities are more likely to be young and middle age adults and are disproportionately male (68%). Compared to a national sample of individuals, the racial distribution of patients receiving SUD treatment in TEDS facilities is more diverse with a breakdown as follows: 69% white, 19% African American, and 12% other race. 9% of

[26] TEDS and N-SSATS belong to a system of datasets used by SAMHSA to monitor the quantity and quality of SUD treatment in the U.S. Thus, the data sets capture different aspects of the SUD treatment delivery system.

the sample is Hispanic. Patients are less educated and less attached to the labor market relative to a national sample. For example, 31% of patients are high school dropouts and 29% are out of the labor market. Just under half of the sample reports alcohol as the primary substance of abuse (49%) with the remainder reporting an illicit drug as the primary substance of abuse.

5.2. Summary statistics

We next return to our analysis of the N-SSATS data. Table 3 reports summary statistics. 66% of providers in our sample accept payments from private insurance, while 56% and 91% accept payments from public insurers and self-payments. Charity care is offered by 77% of providers. The average number of admissions per year is 309 and total patient volume on the census day is 88. 53% of the providers in our sample operate in a state/year with any parity law in place while 39% operate in a state/year with a strong parity law in place.

In terms of provider-level characteristics, 60% of providers report that their primary focus is SUD treatment while 8%, 25%, 3%, and 3% report that their primary focus is mental health treatment, SUD and mental health treatment, general healthcare, and other.[27] Solo practitioners represent 6% of the sample. Private non-profit is the most common ownership status in our sample: 59% of providers report this status. The distribution of ownership status across the remaining providers is 27% private for-profit, 3% state government, 7% local government, 1% Tribal government, and 2% Federal government. Providers located within hospitals represent 14% of the sample and providers receiving government financial support (e.g., subsidies and contracts) represent 55%.

[27] Results are not appreciably different if we drop providers who do not report that SUD treatment (or SUD and mental health treatment) is their primary focus from the analysis sample.

5.3. Regression analysis of provider participation in specific insurance markets

Table 4A and Figures 2A and 2B report, in table format and graphically, selected results from our analysis of the effects of state parity laws on providers' participation in specific insurance markets.

Following passage of a state parity law, we find that providers are less likely to participate in public insurance markets and less likely to provide charity care. However, the effects are not persistent for public market participation and appear to dissipate by 6 years post-passage.[28] For example, passage of a strong parity laws leads to a 2.7 (4.8), 3.4 (6.1), and 4.5 (8.1) percentage point (%) reduction in the probability that a provider will participate in the public market 1 to 2 years, 3 to 4 years, and 5 to 6 years post law passage. In terms of charity care provision, passage of a strong parity law leads to a 4.6 (6.0%) percentage point reduction in the probability that a providers offers his type of care in the year of the law passage and a 4.0 (5.2), 4.2 (5.5), 4.2 (5.5), and 3.9 (5.1) percentage point (%) reduction 1 to 2 years, 2 to 4 years, 5 to 6 years, and 7 or more years post law passage. We also find some evidence that providers may enter the private market following passage of a state parity law: one post-law indicator is statistically distinguishable from zero (the year of law passage in the any parity law regression).

In general, we find that the coefficient estimates are larger and more likely to be statistically different from zero in the regressions that include a strong parity indicator. Moreover, we see little evidence of policy endogeneity (i.e., statistically significant leads). Even

[28] Following predictions from a model of physician supply developed by Chen (2014), our findings for charity care suggest that substitution effects attributable to private insurance expansions dominate income effects.

if there is some anticipatory behavior evident in the data, including the leads in the regression can account for policy endogeneity to some extent.[29]

Our public health insurance variable includes Medicare, Medicaid, and other state financed health insurance plans, these insurance plans plausibly offer different reimbursement rates to providers. We estimate separate regressions for each type of public insurance. Results are reported in Appendix Table A. We find that following passage of a state parity law, providers are less likely to participate in the Medicaid and other (non-Medicaid) state financed insurance (the coefficient in the Medicaid regression is only statistically distinguishable from zero on the strong parity law regression) insurance markets, but passage of such a law does not appear to lead to changes in providers participation in the Medicare or Military markets.

5.4. Regression analysis of treatment quantity

Table 4B and Figures 3A and 3B report selected results for annual admissions and total client volumes. We find that following passage of a strong parity law, but not a less restrictive law, providers increase the quantity of healthcare provided as measured by admissions and number of patients in treatment. Moreover, the effects emerge over time and are not statistically distinguishable from zero until 3 to 4 years after the law passes. This pattern of results is in line with the hypothesis that providers face capacity constraints in the short-run (Carr, Xu et al. 2008) and therefore cannot immediately respond to the increased size of the private insurance market.

Specifically, we find that following passage of a strong parity law, the number of annual admissions increases by 27 (8.7%), 39 (12.6%), and 32 (10.4%) 3 to 4 years, 5 to 6 years, and 7 or more years post law passage. In terms of patient volumes, we find that passage of a strong

[29] Moreover, the sign on the leads often works against finding effects. For example, in the public insurance regressions the leads that are statistically different from zero carry a positive sign, but we find that the lags carry the opposite sign in this regression: negative.

parity law leads to a 7 (7.7%), 14 (16.1%), and 12 (13.2%) increase 3 to 4 years, 5 to 6 years, and 7 or more years post law passage. Although speculative, the combination of increasing number of annual admissions and patient volumes is suggestive that length of stay *declines* following passage of strong state parity law. However, we lack data on length of stay and therefore cannot definitively test this hypothesis. We find evidence of increased patient volumes 7 or more years pre-law, but these increases are not apparent in the years leading up to the law passage.

6. Extensions and robustness checks

We next describe extensions to the main analyses and robustness checking.

6.1. Heterogeneity by ownership status

Whether, and to what extent, SUD treatment providers respond to increased coverage for treatment services could depend on their ownership status. Research on hospitals suggests potential differences in expenditures, treatment offerings, and quality of care by ownership status (Sloan, Picone et al. 2001, Silverman and Skinner 2004, Horwitz 2005). In particular for-profit hospitals are more likely than government or nonprofit hospitals to respond to incentive changes to minimize costs and maximize revenues. Moreover, there is some evidence that SUD treatment provider behavior may also vary across ownership status (Richter, Choi et al. 2004, Bachhuber, Southern et al. 2014). We expect that for-profit SUD treatment providers will be more responsive to increased demand from newly privately insured clients.

Tables 5A and 5B,and Figures 4A, 4B, 5A, and 5B report regression results for participation in specific insurance markets and quantity of healthcare services for (i) for-profits and (ii) nonprofits (we classify both nonprofits and government run facilities as nonprofits). For brevity, we report results generated in models that include the strong parity law only.

In general, we find that for-profits and nonprofits respond to the passage of a state parity law in a similar manner. In particular, both types of providers are less likely to participate in the public market, are less likely to provide charity care, and increase the quantity of healthcare provided following the passage of a state parity law. However, the magnitude of the effects is generally larger in the for-profit sample than in the nonprofit sample.

6.2. Cream skimming

If SUD providers can be more selective about the type of patient they admit following passage of a state parity law, we may observe shifts in client characteristics (i.e., 'cream skimming'). Ideally, we would like to study the relative profitability of patients receiving treatment before and after passage of a parity law. However, we lack data on this information in the N-SSATS. Thus, we rely on a potential proxy variable. Specifically, we study the effect of state SUD parity laws on the share of patients in treatment for alcohol or illicit drug use disorder ('mono-substance use') as opposed to patients in treatment for both alcohol and illicit drug use disorders.[30] While this variable is not an ideal proxy, we believe it is potentially useful.

Previous research suggests that patients suffering from poly-substance use disorders are less responsive to SUD treatment (Dutra, Stathopoulou et al. 2008, Martinotti, Carli et al. 2009). Moreover, patients suffering from poly-substance use have characteristics that suggest that they represent a less advantaged patient population that suffers from numerous co-morbidities that may increase the cost of treatment. For example, Martinotti, Carli et al. (2009) find that, relative to individuals with mono-substance use disorders, those with poly-substance use disorders are more likely to be separated or divorced and unemployed; are more likely to have suffered

[30] Results for alcohol and illicit drug use disorder (poly-substance) use are symmetric and available on request. These definitions are not equivalent to what healthcare providers refer to as poly-substance use disorder: the use of three or more substances (excluding caffeine and nicotine) with no single substance dominating. However, our data will not allow us to construct a variable that maps to the clinical definition.

childhood emotional and physical abuse; display higher levels of aggression, hostility, and impulsivity; are more likely to attempt suicide and self-mutilate; and have higher prevalence rates of mental health disorders (e.g., depression). While not definitive, these characteristics suggest that, relative to patients suffering from mono-substance use disorder, those patients suffering from poly-substance use disorder may be more costly to treat.

Of course, the relevant margin in the context of provider cream-skimming is patient profitability, which encompasses both treatment costs and revenues. While there is substantial heterogeneity across plans in terms of SUD treatment coverage, it is possible that reimbursement rates for specific services are adjusted for types of substances being treated.[31] Thus, patients receiving treatment for different types of SUDs (e.g., cocaine vs. opioids) may offer providers different per service reimbursements. However, to the best of our knowledge, rates per service do not fully capture the fact that a patient suffers from multiple additions, which may open the door to the possibility that the rates do not fully incorporate the potential higher costs of patients in treatment for poly-substance use vs. mono-substance use. However, we note that our proxy for cream-skimming is not ideal and we interpret findings from this analysis with some caution, and encourage readers to do the same.

If providers engage in cream-skimming and our profitability assumptions hold, we might expect that the share of clients in treatment for mono-substance (poly-substance) use will increase (decrease) following the enactment of a state SUD parity law. A limitation of these variables is that we cannot separate clients who misuse one or more illicit drugs, and such patterns of use also constitute poly-substance use. Moreover, it may be that shifts in participation in specific insurance markets may mechanically lead to shifts in client

[31] Based on our non-exhaustive review of publicly available plan books. More details available from the corresponding author.

characteristics. For example, if providers increase participation in private markets and the privately insured are, on average, less likely to suffer from poly-substance use then changes in market participation can mechanically lead to changes in the variables we study.

We estimate models for the full sample, for-profits, and nonprofits. Regression results are reported in Table 6 and Figure 6 (strong parity results are reported for brevity). Overall, we find that following a state parity law, providers have more patients in treatment for mono-substance use and this finding is driven entirely by the behavior of for-profit providers. For example, among for-profit providers following the passage of a state parity law we find that the share of patients in treatment for mono-substance use increases by 3 to 4 percentage points (5 to 8%) and this increase is immediately observable and does not appear to dissipate over time.

6.3. Additional robustness checks

We next discuss additional robustness checks. Results are not reported for brevity, but they are available on request from the corresponding author.

6.3.1. Alternative control groups

In our analyses presented thus far we include states that do not pass a state parity law during our study period in our control group of states. One concern is that these states are not a suitable control group, that is they would not have followed the same trends in our outcomes in the post-treatment period as our treatment states (those states that passed a parity law), had the control states received treatment. To address this concern, we re-estimate Equation (1) including only those states that passed a parity law by 2010. Thus, the comparison group in this sample includes states that pass a parity law during our study period in the years before these states passed a law. We also re-estimate Equation (1) excluding states that passed a state parity far in advance of our study period (1997 to 2010) as such states, which we only observe in the most

distal pre-event bin may confound our results. More specifically, we exclude states that passed their parity law prior to 1988. Finally, we retain only providers that report SUD treatment as their main focus in the sample as we expect that these providers should be most affected by the parity laws we study. The coefficient estimates generated in these alternative samples are not appreciably different than those generated in the main sample.

6.3.2 Firm size

State parity laws do not impact self-insured firms due to ERISA and larger firms are more likely to self-insure than smaller firms. Thus, we would expect that the effects of parity laws to be larger in states with larger shares of small firms. Following Kaestner and Simon (2002), we define small firms as those with less than 100 workers and we re-estimate Equation (1) in the sample of states for which the share of workers employed at a small firm is above the sample mean value. As expected, the coefficient estimates generated in this sample are somewhat larger than those reported in the full sample.

6.3.3. Compositional changes in the sample

Parity laws could potential lead to the entry or exit of providers into the SUD treatment market. Such patterns could change the composition of providers in the market and lead to bias. To explore such compositional change we regress the number of (i) total providers, (ii) for-profit providers, and (iii) nonprofit providers on our state parity laws in Equation (1). We find no evidence that state parity laws lead to changes in the number of providers in the market.

6.3.4. Treatment intensity

We next consider whether state parity laws lead to changes in treatment intensity. A theory of provider induced demand (PID) could imply that as the private market expands, and thus the share of patients with insurance coverage for SUD treatment expands, providers may use

their agency position to induce more intensive treatment to increase profits. While inducement is clearly possible pre-expansion, there may be more scope (i.e., more patients with insurance) post-expansion. More specifically, we consider (i) the number of patients receiving inpatient and outpatient care, (ii) the number of testing and ancillary services (e.g., testing for sexually transmitted diseases, childcare services; range: 0-22),[32] (iii) the number of programs for special populations (e.g., pregnant women; range: 0-6),[33] [34] (iv) and an indicator for use of any medications to treat addiction (e.g., methadone).[35] A limitation of this analysis is that while changes in our outcomes may reflect PID, they may also reflect providers aligning their service offerings with the needs of their newly insured patients, if the needs of previously and newly insured patients differ. None-the-less, we find little evidence that providers alter the settings in which patients receive care or service offerings following passage of a state parity law.

7. Discussion

In this study we apply the Sloan mixed economy model to the context of substance use disorder (SUD) treatment providers. Specifically, we test whether private health insurance expansions for SUD treatment services impact the health insurance markets in which providers are willing to participate, provision of charity care, and the quantity of healthcare provided. We further test if, following passage of such expansions, providers become more selective in the type

[32] Testing and ancillary services include comprehensive SUD assessment at intake, comprehensive mental health assessment at intake, alcohol blood testing, alcohol/illicit drug urine testing, HIV/AIDS testing, other STD testing, TB testing, discharge planning, aftercare counseling, child care, social services assistance, employment assistance, housing assistance, domestic violence education, HIV/AIDS education, transportation assistance, acupuncture, individual counseling, group counseling, family counseling, and outcome follow-up after discharge.
[33] Special programs include adolescents, dually diagnosed, women, pregnant/postpartum women, and other groups. This variable is not truly continuous as it takes on just seven values. In unreported analyses, we constructed an indicator for any special program and re-estimated our regression models. Results are not appreciably changed.
[34] In selecting the special programs and testing services to include, we chose those services that were reported in each year of the N-SSATS between 1997 and 2009.
[35] Although the specific pharmacotherapies collected in N-SSATS change across survey year, we include the following pharmacotherapies where available: antabuse, naltrexone, buprenorphine, methadone, campral, nicotine replacement, medications for psychiatric disorders, and smoking cessation products. More details on this variable are available on request from the corresponding author.

of patient they are willing to accept ('cream skimming'). In all analyses, we explore possible heterogeneity by ownership status (for-profits vs. nonprofits/government).

Our findings suggest that private health expansions lead providers to reduce participation in public health insurance markets and to reduce provision of charity care. Moreover, providers increase the quantity of healthcare provided in terms of annual admissions and number of patients in treatment, and become more selective in terms of the patients they are willing to admit. We identify heterogeneity across for-profit and nonprofit providers: the magnitude of the effects we estimate are larger in the for-profit sample than in the nonprofit sample.

Because our analysis is intent-to-treat, we must consider whether the size of our estimated effects is reasonable. One possible way to examine the plausibility of our estimated treatment effect magnitudes is to consider the extent to which private insurance is used to pay for SUD treatment services by patients themselves. As noted earlier in the manuscript, historically private (and public) insurance has played a relatively smaller role in the financing of SUD treatment relative to general healthcare services in the U.S. However, this differential does not imply that private insurance is not an important source of financing within the SUD treatment delivery system. Indeed, data from the 2010 National Survey of Drug Use and Health (NSDUH) suggests that 40% of patients receiving specialty SUD treatment in the past year used private health insurance as a source of payment for their last treatment episode (Substance Abuse and Mental Health Services Administration 2010).[36]

Another approach to thinking about our estimated effect size is to consider the share of the population that is affected by state parity laws. According to Jensen and Morrisey (1999),

[36]This estimate potentially understates the true role of private insurance in the financing of SUD treatment as it does not include those individuals who received multiple SUD treatments but did not use private insurance as a source of payment in the last treatment episode.

this share ranges from 33% to 43% of the population. More recent evidence from the Medical Expenditure Panel Survey suggests that during our study period 49% to 57% of private-sector workers insurance beneficiaries worked for a self-insured firm, suggesting that 51% to 43% of such employees were potentially impacted by the policies we study here.[37] Finally, in our sample, 42% of employees worked for a small firm (see Table 3).

We can also examine estimated effect sizes within the related literature. Wen, Cummings et al. (2013) document that passage of a state parity law leads to a 9% increase in SUD treatment admissions, with even larger increases when only those facilities that accept private insurance are considered. The authors estimate a differences-in-differences (DD) model. In unreported analyses, we have estimated a similar DD model and our coefficient estimate is 7% with 95% confidence intervals that encompass 9%. While not definitive, we believe that collectively these statistics suggest that the magnitude of the treatment effect estimates we generate are reasonable.

Our study has limitations. First, we lack information on the extent to which a provider participates in a particular health insurance market; instead we know whether or not a provider participates. While we lack data on this important margin of treatment provision, we can turn to a previous study by Dave and Mukerjee (2011) which explores, among other outcomes, the impact of state parity laws for SUD treatment on the probability that patients will use private insurance to pay for treatment services. The authors document that, following passage of a state parity law, the probability that a patient uses private insurance to pay for treatment increases. This finding suggests that the share of patients in treatment may shift toward the privately insured following passage of a state parity law. Second, our analysis relies on variation from at

[37] Data accessed on December 20th, 2016 from the following table: https://meps.ahrq.gov/mepsweb/data_stats/quick_tables_results.jsp?component=2&prfricon=yes&searchText=insured&subcomponent=2&tableSeries=2&year=-1.

most 18 ‘changer’ states. While we have argued that these changer states are comparable to non-changer states in terms of observable characteristics, the generalizability of our findings is not clear. Third, our findings represent a combination of supply and demand side factors. Our reduced form methods will not allow us to isolate the relative contribution of these factors.

In summary, we offer new evidence on how SUD providers respond to private health insurance markets expansions. These findings may have implications for understanding how expansions that impact specific segments of the healthcare market, either at the state or Federal level, impact provider behaviors and, in turn, the type of patients who are able to access care, the amount of care provided, and the intensity of provided care. If regulations allow for inequalities across insurance markets in terms of coverage generosity, reimbursement rates, etc. then these regulations may lead to differences in access to care and, in turn, outcomes for patients.

Table 1. State SUD parity laws effective dates

State	Effective month and year	N-SSATS effective year
Full parity		
Arkansas	November, 1987	1988
Connecticut	January, 2000	2000*
Delaware	January, 1999	1999*
Hawaii	1988 (no month listed)	1988
Illinois	July, 2010	2011
Maryland	October, 1997	1998*
Minnesota	1999 (no month listed)	1999*
New Jersey	July, 1985	1985
Oklahoma	January, 2000	2000*
Rhode Island	1994 (no month listed)	1994
Vermont	January, 2011	2011
Virginia	January, 2000	2000*
West Virginia	2002 (no month listed)	2002*
Mandated benefits		
Alaska	July, 2004	2005*
Indiana	June, 2003	2004*
Iowa	January, 2011	2011
Kansas	July, 2009	2010*
Maine	1984 (no month listed)	1984
Massachusetts	December, 1973	1974
Michigan	January, 1982	1982
Mississippi	January, 1975	1975
Missouri	July, 1991	1991
Montana	September, 1987	1988
Nebraska	1980 (no month listed)	1980
Nevada	1979 (no month listed)	1979
New Hampshire	1975 (no month listed)	1975
North Dakota	1985 (no month listed)	1985
Ohio	1979 (no month listed)	1979
Oregon	2007 (no month listed)	2007*
Pennsylvania	1990 (no month listed)	1990
Tennessee	July, 2000	2000*
Texas	April, 2005	2006*
Wisconsin	December, 2010	2011
Mandated offer/weak parity		
Colorado	January, 2003	2003*
Florida	1993 (no month listed)	1993
Georgia	1998 (no month)	1998*
Indiana	June, 1997	1997
Louisiana	January, 2009	2009*
New Mexico	July, 1999	1999*
New York	January, 2011	2011
North Carolina	July, 1997	1997
South Carolina	1976 (no month provided)	1976
Tennessee	1982 (no month provided)	1982
Utah	March, 2010	2010*

Notes: Source is the National Conference of State Legislatures Mental Health Benefits Database (accessed May 5th, 2015) and authors' reading of the original state statutes.

*Law change occurred during study period (1998-2009). We do not consider law changes in 1997 as these changes do not offer variation in our differences-in-differences models. If no month is listed, we assume that the law passage occurred in January of the effective year. The N-SSATS survey month is September 1st between 1997 and 2000, and March 1st from 2002 onward.

Table 2. Characteristics of patients receiving SUD treatment: TEDS 1997 to 2010

Variable:	Mean/proportion
21 to 29 years	0.312
30 to 39 years	0.322
40 to 49 years	0.260
50+ years	0.106
Male	0.675
Female	0.325
White	0.692
African American	0.190
Other race	0.118
Hispanic	0.0932
Non-Hispanic	0.907
Less than high school	0.305
High school or more	0.695
Employed	0.335
Unemployed	0.371
NILF	0.293
Alcohol primary substance of abuse	0.497
Illicit drug primary substance of abuse	0.503
Observations	593

Notes: The unit of observation is a state-year. Data for 1999 and 2001 are dropped to match the N-SSATS time period.

Table 3. Summary statistics: N-SSATS 1997-2010

Variable	Sample proportion/mean
Insurance market participation (2000-2010)	
Private	0.661
Public	0.559
Self-pay	0.906
Charity care	0.769
Treatment quantity	
Annual admissions	309.0
Patients volume on census day	88.26
Parity laws	
Any parity law	0.525
Strong parity law (mandated benefits or full parity)	0.385
State characteristics	
Small firm	0.421
Age	36.29
Female	0.490
Male	0.510
Less than high school	0.196
High school or more	0.804
White race	0.809
Non-white race	0.191
Hispanic	0.135
Family income (dollars)	79702
Unemployment rate	7.184
Beer tax (dollars)	0.280
Marijuana decriminalized	0.391
Medical marijuana law	0.230
Prescription drug monitoring program	0.357
Medicaid income eligibility threshold, family of three (dollars)	1366.4
HIFA waiver	0.0518
Block grant funding (millions)	84.64
Minimum wage (dollars)	7.273
Max TANF benefit, family of four (dollars)	640.3
Max SNAP benefit, family of four (dollars)	594.3
State EITC as a proportion of the federal EITC	0.0622
Democrat Governor	0.492
Fair or poor health	0.155
Population (millions)	12.17
Provider characteristics	
SUD treatment primary focus	0.602
Mental health treatment primary focus	0.0802
SUD and mental health treatment primary focus	0.254
General healthcare primary focus	0.0290
Other primary focus	0.0341
Solo practice	0.0604
Private for-profit organization	0.273
Private non-profit organization	0.587
State government	0.0324
Local, county, or community government	0.0703
Tribal government	0.0134
Federal government	0.0246
Located in/operated by hospital	0.136
Receive government subsidies/contracts	0.550
Observations	157989

Table 4A. Effect of state parity laws on insurance market participation and provision of charity care: N-SSATS 2000-2010

Outcome:	Private	Public	Self-pay	Charity care
Sample proportion	0.661	0.559	0.906	0.769
Any parity law				
7 or more years pre-event	-0.008	-0.003	-0.011*	-0.002
	(0.016)	(0.017)	(0.006)	(0.014)
5 to 6 years pre-event	-0.009	0.009	-0.007	-0.008
	(0.014)	(0.014)	(0.007)	(0.009)
4 to 3 years pre-event	0.003	0.015*	-0.007*	0.000
	(0.011)	(0.009)	(0.004)	(0.008)
Event year	0.019*	-0.007	0.003	-0.028**
	(0.010)	(0.012)	(0.007)	(0.013)
1 to 2 years post-event	0.012	-0.028**	0.006	-0.040***
	(0.009)	(0.013)	(0.012)	(0.013)
3 to 4 years post-event	0.011	-0.026*	0.011	-0.029*
	(0.015)	(0.015)	(0.011)	(0.016)
5 to 6 years post-event	-0.011	-0.011	0.004	-0.031
	(0.019)	(0.019)	(0.012)	(0.019)
7 or more years post-event	-0.020	-0.001	0.001	-0.032
	(0.021)	(0.025)	(0.012)	(0.020)
Strong parity law†				
7 or more years pre-event	0.008	0.021	-0.006	0.011
	(0.023)	(0.018)	(0.007)	(0.015)
5 to 6 years pre-event	-0.006	0.008	0.002	-0.017*
	(0.018)	(0.012)	(0.007)	(0.009)
4 to 3 years pre-event	-0.001	0.019**	-0.003	-0.002
	(0.014)	(0.008)	(0.005)	(0.007)
Event year	0.018	-0.007	0.007	-0.046***
	(0.014)	(0.013)	(0.007)	(0.014)
1 to 2 years post-event	0.011	-0.027**	0.009	-0.040***
	(0.014)	(0.013)	(0.012)	(0.010)
3 to 4 years post-event	0.017	-0.034***	0.012	-0.042***
	(0.015)	(0.012)	(0.012)	(0.013)
5 to 6 years post-event	-0.002	-0.045***	0.007	-0.042*
	(0.017)	(0.016)	(0.012)	(0.021)
7 or more years post-event	-0.014	-0.024	0.012	-0.039**
	(0.021)	(0.025)	(0.012)	(0.018)
Observations	133884	133884	133884	133884

Notes: The unit of observation is a facility in a state in a year. All models estimated with a LPM and control for state characteristics, provider characteristics, state fixed effects, and year fixed effects. The omitted period in event time is 2 to 1 years pre-event. Standard errors clustered at state level and reported in parentheses.
***;**;*=statistically different from zero at the 1%;5%;10% level.
†A strong parity law is defined as a law that requires mandated benefits or full parity.

Table 4B. Effect of state parity laws on treatment quantity: N-SSATS 1997-2010

Outcome:	**Annual admissions**	**Patient volume**
Sample mean	309.0	88.26
Any parity law		
7 or more years pre-event	10.069	5.877
	(14.451)	(4.943)
5 to 6 years pre-event	13.852	3.616
	(20.204)	(3.162)
4 to 3 years pre-event	12.285*	-0.508
	(7.162)	(2.665)
Event year	9.094	-0.111
	(15.310)	(2.751)
1 to 2 years post-event	-10.343	0.822
	(20.033)	(5.033)
3 to 4 years post-event	-23.338	-0.661
	(23.995)	(4.353)
5 to 6 years post-event	-17.547	5.071
	(27.535)	(4.446)
7 or more years post-event	-20.219	2.801
	(24.283)	(5.917)
Strong parity law†		
7 or more years pre-event	11.954	10.451**
	(17.714)	(4.844)
5 to 6 years pre-event	-8.928	1.759
	(10.659)	(3.925)
4 to 3 years pre-event	6.408	-0.549
	(6.702)	(3.191)
Event year	8.937	2.259
	(10.549)	(3.065)
1 to 2 years post-event	16.817	6.980
	(11.696)	(4.745)
3 to 4 years post-event	26.936**	6.797*
	(12.828)	(3.844)
5 to 6 years post-event	38.788***	14.182***
	(13.602)	(3.791)
7 or more years post-event	32.032*	11.635*
	(17.967)	(6.892)
Observations	145014	147391

Notes: The unit of observation is a facility in a state in a year. All models estimated with LS and control for state characteristics, provider characteristics, state fixed effects, and year fixed effects. The omitted period in event time is 2 to 1 years pre-event. Standard errors clustered at state level and reported in parentheses.
***;**;*=statistically different from zero at the 1%;5%;10% level.
†A strong parity law is defined as a law that requires mandated benefits or full parity.

Table 5A. Heterogeneity by ownership status in the effect of a strong state parity law† on insurance market participation and provision of charity care: N-SSATS 2000-2010

Outcome:	Private	Public	Self-pay	Charity care
For-profits				
Sample proportion	0.666	0.541	0.981	0.577
7 or more years pre-event	0.024	0.027	-0.006	0.016
	(0.028)	(0.032)	(0.008)	(0.023)
5 to 6 years pre-event	-0.002	-0.030	-0.003	-0.017
	(0.023)	(0.018)	(0.010)	(0.011)
4 to 3 years pre-event	0.009	0.022	-0.009	-0.002
	(0.027)	(0.015)	(0.009)	(0.017)
Event year	0.029	0.006	0.004	-0.016
	(0.025)	(0.017)	(0.006)	(0.014)
1 to 2 years post-event	-0.013	-0.046**	0.003	-0.077***
	(0.022)	(0.017)	(0.006)	(0.017)
3 to 4 years post-event	-0.011	-0.050**	0.007	-0.101***
	(0.025)	(0.019)	(0.007)	(0.018)
5 to 6 years post-event	0.001	-0.061**	0.000	-0.114***
	(0.024)	(0.026)	(0.006)	(0.025)
7 or more years post-event	-0.000	-0.038	0.003	-0.118***
	(0.031)	(0.047)	(0.009)	(0.024)
Observations	36804	36804	36804	36804
Non-profits				
Sample proportion	0.659	0.731	0.877	0.842
7 or more years pre-event	-0.007	0.016	-0.008	0.009
	(0.021)	(0.014)	(0.009)	(0.017)
5 to 6 years pre-event	-0.012	0.023**	0.004	-0.022*
	(0.018)	(0.011)	(0.011)	(0.012)
4 to 3 years pre-event	-0.007	0.018**	0.001	-0.005
	(0.007)	(0.008)	(0.005)	(0.008)
Event year	0.013	-0.014	0.008	-0.051***
	(0.013)	(0.014)	(0.009)	(0.013)
1 to 2 years post-event	0.016	-0.020	0.010	-0.031***
	(0.012)	(0.013)	(0.016)	(0.009)
3 to 4 years post-event	0.022	-0.027**	0.013	-0.033***
	(0.014)	(0.012)	(0.016)	(0.011)
5 to 6 years post-event	-0.002	-0.038**	0.009	-0.023
	(0.019)	(0.016)	(0.015)	(0.020)
7 or more years post-event	-0.022	-0.021	0.014	-0.018
	(0.024)	(0.022)	(0.016)	(0.017)
Observations	97080	97080	97080	97080

Notes: The unit of observation is a facility in a state in a year. All models estimated with a LPM and control for state characteristics, provider characteristics, state fixed effects, and year fixed effects. The omitted period in event time is 2 to 1 years pre-event. Standard errors clustered at state level and reported in parentheses.
***;**;*=statistically different from zero at the 1%;5%;10% level.
†A strong parity law is defined as a law that requires mandated benefits or full parity.

Table 5B. Heterogeneity by ownership status in the effect of a strong state parity law† on treatment quantity: N-SSATS 1997-2010

Outcome:	Annual admissions	Patient volume
For-profits		
Sample mean	257.43	88.70
7 or more years pre-event	32.011*	4.025
	(17.257)	(6.052)
5 to 6 years pre-event	-16.264	-3.609
	(13.657)	(3.471)
4 to 3 years pre-event	-15.694	-6.282**
	(12.645)	(3.046)
Event year	6.395	4.240
	(15.841)	(4.497)
1 to 2 years post-event	3.408	2.641
	(21.145)	(3.563)
3 to 4 years post-event	31.117	17.865**
	(22.149)	(8.049)
5 to 6 years post-event	46.766**	24.393**
	(22.934)	(9.954)
7 or more years post-event	50.845**	26.990***
	(24.721)	(9.728)
Observations	39915	40621
Non-profits		
Sample mean	328.52	88.10
7 or more years pre-event	1.801	13.661**
	(21.970)	(5.391)
5 to 6 years pre-event	-8.790	4.964
	(15.640)	(4.972)
4 to 3 years pre-event	10.910	1.507
	(10.094)	(3.865)
Event year	7.322	1.010
	(13.274)	(4.180)
1 to 2 years post-event	20.450	8.567
	(12.362)	(6.575)
3 to 4 years post-event	23.443	1.737
	(14.043)	(3.930)
5 to 6 years post-event	36.527**	8.460*
	(15.065)	(4.716)
7 or more years post-event	28.749	4.424
	(23.665)	(8.909)
Observations	105099	106770

Notes: The unit of observation is a facility in a state in a year. All models estimated with LS and control for state characteristics, provider characteristics, state fixed effects, and year fixed effects. The omitted period in event time is 2 to 1 years pre-event. Standard errors clustered at state level and reported in parentheses.
***;**;*=statistically different from zero at the 1%;5%;10% level.
†A strong parity law is defined as a law that requires mandated benefits or full parity.

Table 6. Effect of a strong state parity law† on the share of patients in treatment for mono-substance use: N-SSATS 1997-2010

Sample:	Full sample	For-profits	Nonprofits
Sample mean	46.44	53.42	43.80
7 or more years pre-event	-1.361	-1.519	-1.384
	(1.223)	(1.267)	(1.396)
5 to 6 years pre-event	-2.119*	-1.147	-2.328*
	(1.173)	(2.172)	(1.259)
4 to 3 years pre-event	-1.820**	-2.091*	-1.622*
	(0.771)	(1.183)	(0.896)
Event year	0.733	4.110***	-0.623
	(1.058)	(1.312)	(1.199)
1 to 2 years post-event	1.478	3.787***	0.369
	(0.908)	(1.145)	(1.031)
3 to 4 years post-event	1.161	2.848*	0.334
	(1.122)	(1.545)	(1.218)
5 to 6 years post-event	1.968*	3.582***	0.943
	(1.170)	(1.267)	(1.306)
7 or more years post-event	2.363*	4.320***	1.359
	(1.336)	(1.487)	(1.484)
Observations	143993	39547	104446

Notes: The unit of observation is a facility in a state in a year. All models estimated with LS and control for state characteristics, provider characteristics, state fixed effects, and year fixed effects. The omitted period in event time is 2 to 1 years pre-event. Standard errors clustered at state level and reported in parentheses.
***;**;*=statistically different from zero at the 1%;5%;10% level.
†A strong parity law is defined as a law that requires mandated benefits or full parity.

Appendix Table A. Effect of state parity laws on specific public insurance market participation: N-SSATS 2000-2010

Outcome:	Medicaid	Medicare	Other state financed	Military
Sample proportion	0.536	0.342	0.355	0.331
Any parity law				
7 or more years pre-event	0.003	0.011	-0.015	-0.005
	(0.019)	(0.015)	(0.025)	(0.012)
5 to 6 years pre-event	0.003	0.001	0.001	-0.008
	(0.012)	(0.010)	(0.019)	(0.012)
4 to 3 years pre-event	0.002	0.002	0.004	-0.007
	(0.008)	(0.008)	(0.011)	(0.009)
Event year	-0.010	0.001	-0.018	0.001
	(0.019)	(0.013)	(0.013)	(0.011)
1 to 2 years post-event	-0.027	-0.006	-0.047***	0.003
	(0.023)	(0.012)	(0.010)	(0.017)
3 to 4 years post-event	-0.008	0.014	-0.056***	0.001
	(0.026)	(0.013)	(0.014)	(0.019)
5 to 6 years post-event	0.012	0.009	-0.061***	-0.004
	(0.033)	(0.016)	(0.014)	(0.020)
7 or more years post-event	0.023	-0.010	-0.038	-0.023
	(0.034)	(0.014)	(0.023)	(0.022)
Strong parity law†				
7 or more years pre-event	0.009	0.028*	0.049**	-0.006
	(0.023)	(0.016)	(0.022)	(0.017)
5 to 6 years pre-event	0.005	0.005	0.015	-0.030***
	(0.014)	(0.011)	(0.022)	(0.010)
4 to 3 years pre-event	0.008	-0.002	0.010	-0.019*
	(0.009)	(0.009)	(0.012)	(0.010)
Event year	-0.016	0.005	-0.021	0.005
	(0.018)	(0.014)	(0.015)	(0.011)
1 to 2 years post-event	-0.046**	0.003	-0.035***	0.010
	(0.022)	(0.013)	(0.012)	(0.017)
3 to 4 years post-event	-0.048**	0.016	-0.050***	0.009
	(0.023)	(0.014)	(0.015)	(0.018)
5 to 6 years post-event	-0.048*	-0.001	-0.061***	-0.008
	(0.027)	(0.015)	(0.019)	(0.021)
7 or more years post-event	-0.021	0.002	-0.046	-0.021
	(0.034)	(0.016)	(0.028)	(0.022)
Observations	133884	133884	133884	133884

Notes: The unit of observation is a facility in a state in a year. All models estimated with a LPM and control for state characteristics, provider characteristics, state fixed effects, and year fixed effects. The omitted period in event time is 2 to 1 years pre-event. Standard errors clustered at state level and reported in parentheses.
***;**;*=statistically different from zero at the 1%;5%;10% level.
†A strong parity law is defined as a law that requires mandated benefits or full parity.

Figure 1. Sloan mixed economy model.

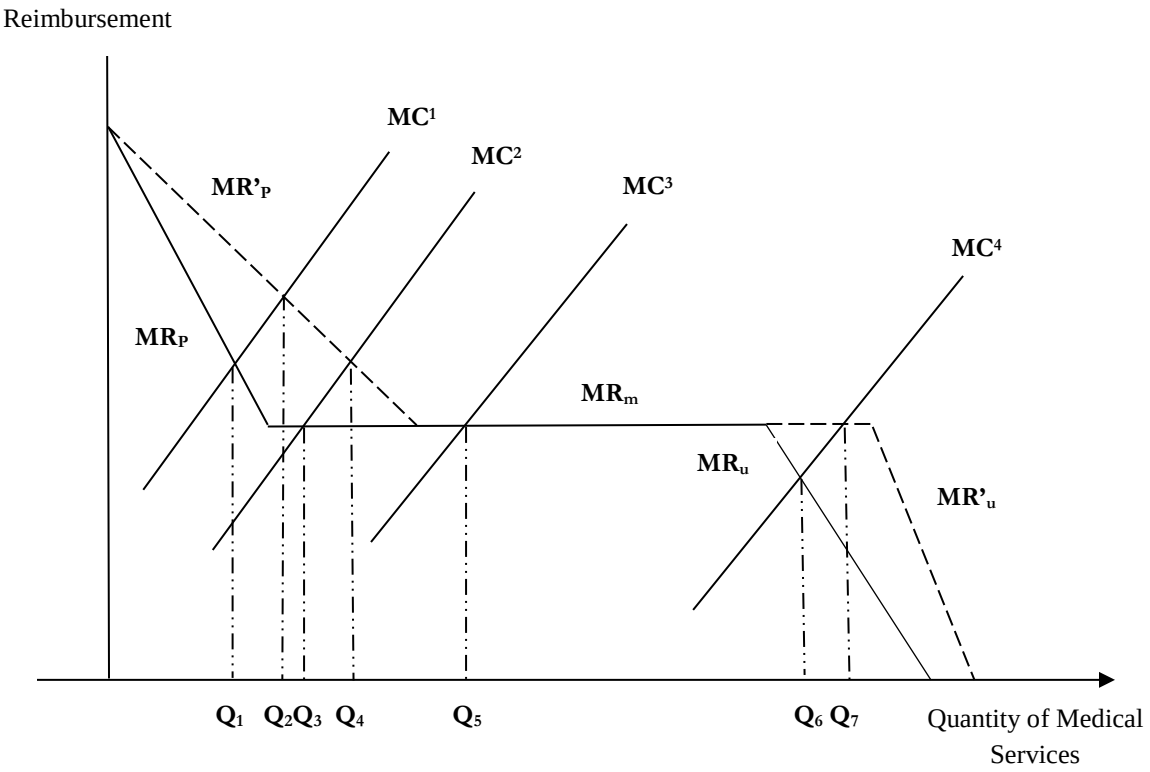
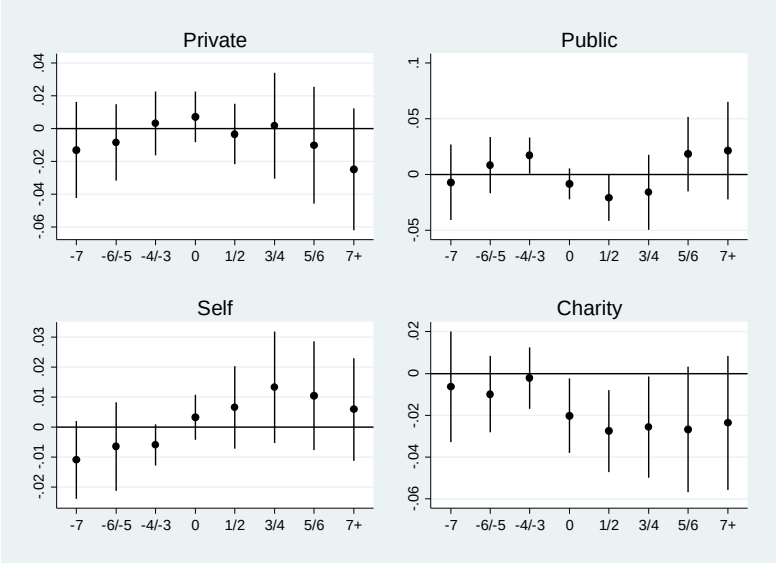
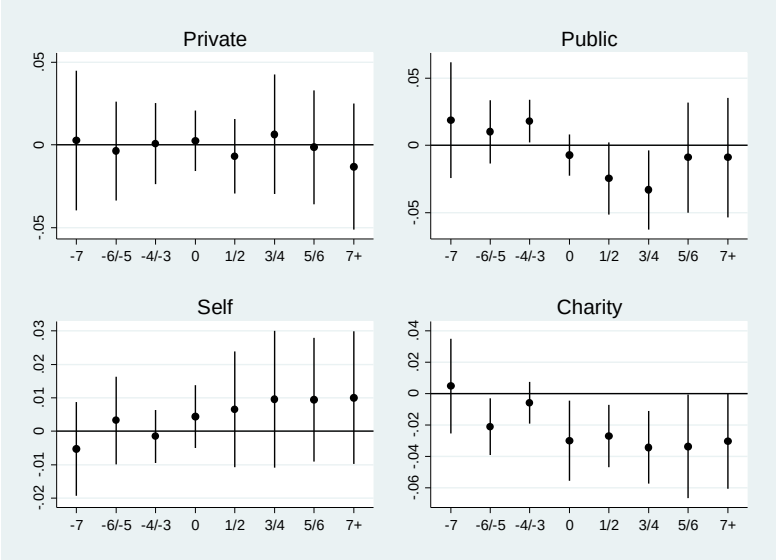


Figure 2A. Effect of a state parity law on insurance market participation and provision of charity care: N-SSATS 2000-2010



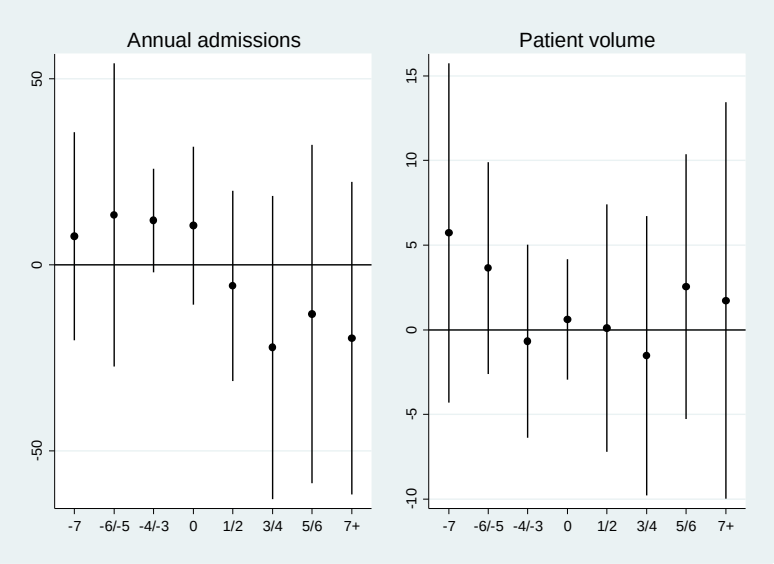
Notes: The unit of observation is a facility in a state in a year. All models estimated with a LPM and control for state characteristics, provider characteristics, state fixed effects, and year fixed effects. The omitted period in event time is 2 to 1 years pre-event. 95% confidence intervals that account for state clustering are reported with vertical lines.

Figure 2B. Effect of state a strong parity law on insurance market participation and provision of charity care: N-SSATS 2000-2010



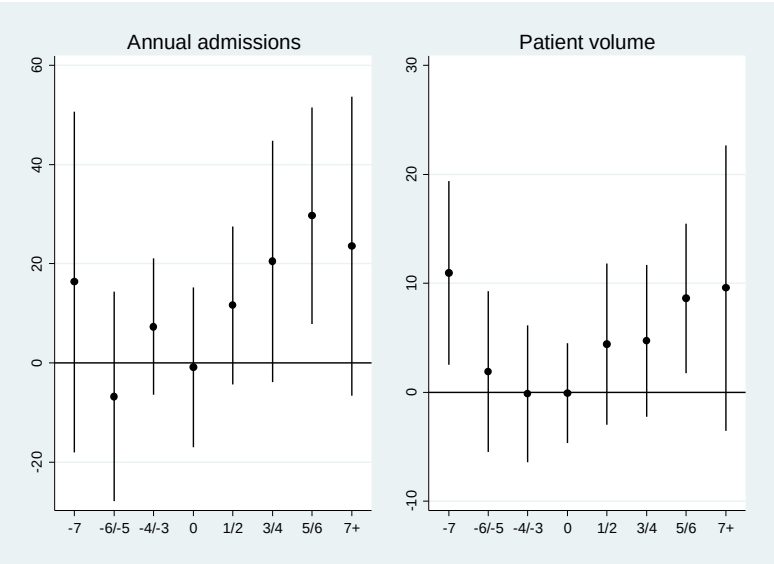
Notes: The unit of observation is a facility in a state in a year. All models estimated with a LPM and control for state characteristics, provider characteristics, state fixed effects, and year fixed effects. The omitted period in event time is 2 to 1 years pre-event. 95% confidence intervals that account for state clustering are reported with vertical lines. A strong parity law is defined as a law that requires mandated benefits or full parity.

Figure 3A. Effect of state any parity law on treatment quantity: N-SSATS 1997-2010



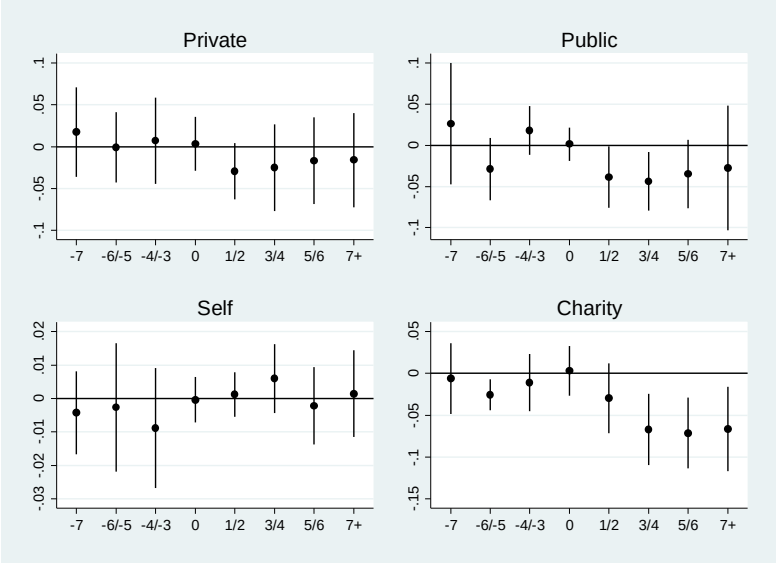
Notes: The unit of observation is a facility in a state in a year. All models estimated with OLS and control for state characteristics, provider characteristics, state fixed effects, and year fixed effects. The omitted period in event time is 2 to 1 years pre-event. 95% confidence intervals that account for state clustering are reported with vertical lines.

Figure 3B. Effect of a strong state parity law on treatment quantity: N-SSATS 1997-2010



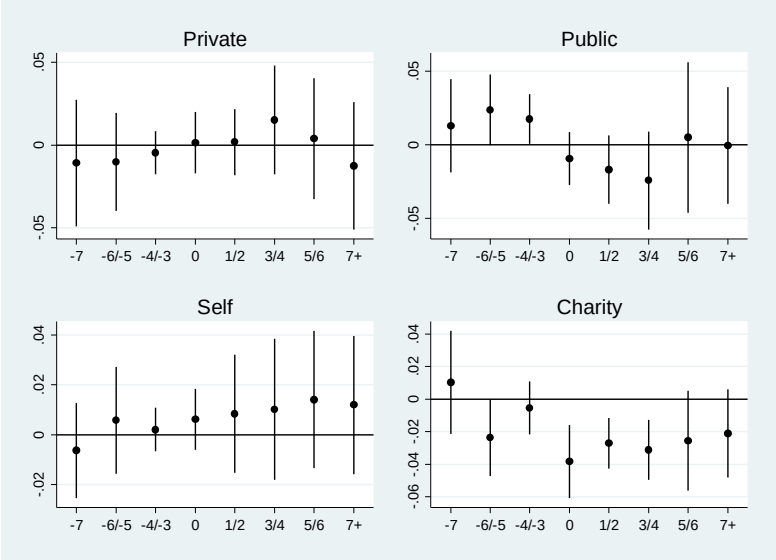
Notes: The unit of observation is a facility in a state in a year. All models estimated with OLS and control for state characteristics, provider characteristics, state fixed effects, and year fixed effects. The omitted period in event time is 2 to 1 years pre-event. 95% confidence intervals that account for state clustering are reported with vertical lines. A strong parity law is defined as a law that requires mandated benefits or full parity.

Figure 4A. Effect of a strong state parity law on insurance market participation and provision of charity care among for-profit facilities: N-SSATS 2000-2010



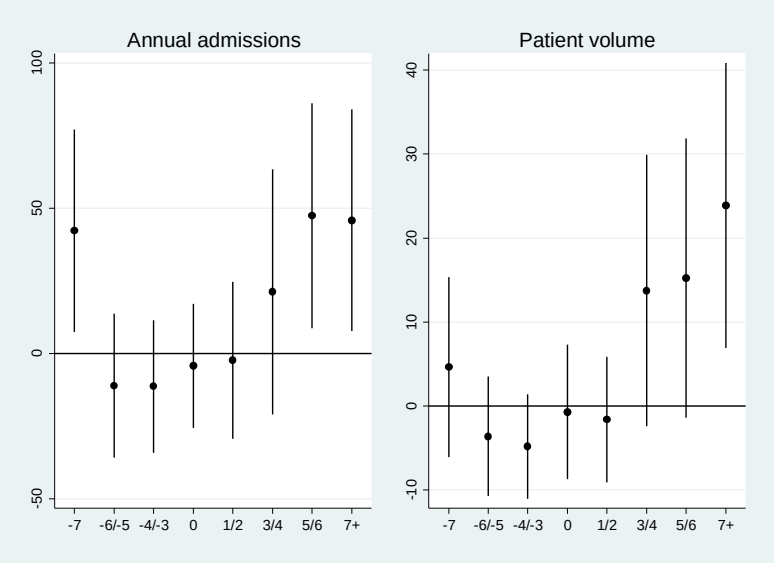
Notes: The unit of observation is a facility in a state in a year. All models estimated with a LPM and control for state characteristics, provider characteristics, state fixed effects, and year fixed effects. The omitted period in event time is 2 to 1 years pre-event. 95% confidence intervals that account for state clustering are reported with vertical lines. A strong parity law is defined as a law that requires mandated benefits or full parity.

Figure 4B. Effect of a strong state parity law on insurance market participation and provision of charity care among nonprofit facilities: N-SSATS 2000-2010



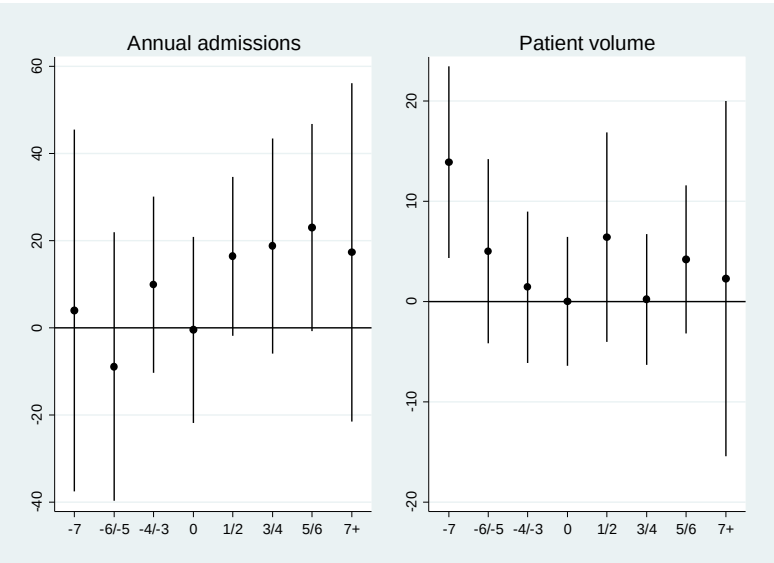
Notes: The unit of observation is a facility in a state in a year. All models estimated with a LPM and control for state characteristics, provider characteristics, state fixed effects, and year fixed effects. The omitted period in event time is 2 to 1 years pre-event. 95% confidence intervals that account for state clustering are reported with vertical lines. A strong parity law is defined as a law that requires mandated benefits or full parity.

Figure 5A. Effect of a strong state parity law on treatment quantity among for-profit facilities: N-SSATS 2000-2010



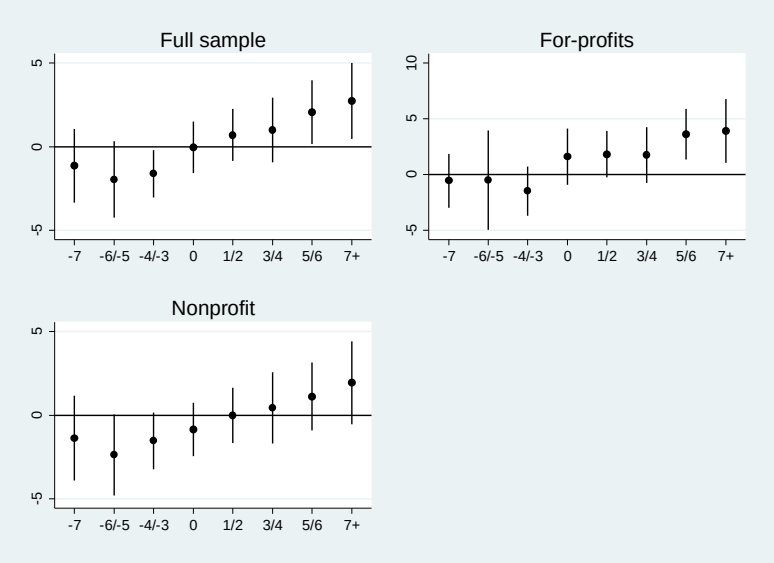
Notes: The unit of observation is a facility in a state in a year. All models estimated with OLS and control for state characteristics, provider characteristics, state fixed effects, and year fixed effects. The omitted period in event time is 2 to 1 years pre-event. 95% confidence intervals that account for state clustering are reported with vertical lines. A strong parity law is defined as a law that requires mandated benefits or full parity.

Figure 5B. Effect of a strong state parity law on treatment quantity among nonprofit facilities: N-SSATS 1997-2010



Notes: The unit of observation is a facility in a state in a year. All models estimated with OLS and control for state characteristics, provider characteristics, state fixed effects, and year fixed effects. The omitted period in event time is 2 to 1 years pre-event. 95% confidence intervals that account for state clustering are reported with vertical lines. A strong parity law is defined as a law that requires mandated benefits or full parity.

Figure 6. Effect of a strong state parity law on the share of patients in treatment for mono-substance use: N-SSATS 1997-2010



Notes: The unit of observation is a facility in a state in a year. All models estimated with OLS and control for state characteristics, provider characteristics, state fixed effects, and year fixed effects. The omitted period in event time is 2 to 1 years pre-event. 95% confidence intervals that account for state clustering are reported with vertical lines. A strong parity law is defined as a law that requires mandated benefits or full parity.

References

Adams, S., M. L. Blackburn and C. D. Cotti (2012). "Minimum Wages and Alcohol-Related Traffic Fatalities among Teens." Review of Economics and Statistics **94**(3): 828-840.

Akosa Antwi, Y., A. S. Moriya and K. I. Simon (2015). "Access to health insurance and the use of inpatient medical care: Evidence from the Affordable Care Act young adult mandate." Journal of Health Economics **39**: 171-187.

Anderson, D. M. (2010). "Does Information Matter? The Effect of the Meth Project on Meth Use among Youths." Journal of Health Economics **29**(5): 732-742.

Anderson, G. F. (2007). "From 'soak the rich'to 'soak the poor': recent trends in hospital pricing." Health Affairs **26**(3): 780-789.

Bachhuber, M. A., W. N. Southern and C. O. Cunningham (2014). "Profiting and providing less care: comprehensive services at for-profit, nonprofit, and public opioid treatment programs in the United States." Med Care **52**(5): 428-434.

Baker, L. C. and A. B. Royalty (2000). "Medicaid Policy, Physician Behavior, and Health Care for the Low-Income Population." The Journal of Human Resources **35**(3): 480-502.

Balsa, A. I., M. T. French, J. C. Maclean and E. C. Norton (2009). "From Pubs to Scrubs: Alcohol Misuse and Health Care Use." Health Services Research **44**(5): 1480-1503.

Bondurant, S., J. M. Lindo and I. D. Swensen (2016). "Substance Abuse Treatment Centers and Local Crime." NBER Working Paper(w22610).

Buchmueller, T., S. Miller and M. Vujicic (2016). "How Do Providers Respond to Changes in Public Health Insurance Coverage? Evidence from Adult Medicaid Dental Benefits." American Economic Journal: Economic Policy **8**(4): 70-102.

Buck, J. A. (2011). "The looming expansion and transformation of public substance abuse treatment under the Affordable Care Act." Health Aff (Millwood) **30**(8): 1402-1410.

Busch, S. H., A. J. Epstein, M. O. Harhay, D. A. Fiellin, H. Un, D. Leader and C. L. Barry (2014). "The Effects of Federal Parity on Substance Use Disorder Treatment." American Journal of Managed Care **20**(1): 76-82.

Busch, S. H., E. Meara, H. A. Huskamp and C. L. Barry (2013). "Characteristics of Adults With Substance Use Disorders Expected to Be Eligible for Medicaid Under the ACA." Psychiatric services (Washington, D.C.) **64**(6): 520-526.

Cameron, C. A. and D. L. Miller (2015). "A Practitioner's Guide to Cluster-Robust Inference." Journal of Human Resources **50**(2): 317-372.

Carpenter, C. (2007). "Heavy alcohol use and crime: Evidence from underage drunk-driving laws." Journal of Law & Economics **50**(3): 539-557.

Carpenter, C. and C. Dobkin (2009). "The Effect of Alcohol Consumption on Mortality: Regression Discontinuity Evidence from the Minimum Drinking Age." American Economic Journal-Applied Economics **1**(1): 164-182.

Carpenter, C. and C. Dobkin (2011). "The Minimum Legal Drinking Age and Public Health." Journal of Economic Perspectives **25**(2): 133-156.

Carr, C. J. A., J. M. Xu, C. Redko, D. T. Lane, R. C. Rapp, J. Goris and R. G. Carlson (2008). "Individual and system influences on waiting time for substance abuse treatment." Journal of Substance Abuse Treatment **34**(2): 192-201.

Caulkins, J. P., A. Kasunic and M. A. Lee (2014). "Societal burden of substance abuse." International Public Health Journal **6**(3): 269-282.

Chen, A. (2014). Do the Poor Benefit from More Generous Medicaid Physician Payments? Social Science Research Network Working Paper Series, Social Science Research Network.

Clemens, J. (2013). The effect of us health insurance expansions on medical innovation. NBER Working Paper Series. N. B. o. E. Research. Cambridge, MA, National Bureau of Economic Research.
Cutler, D. M. and J. Gruber (1996). "Does public insurance crowd out private insurance?" Quarterly Journal of Economics **111**(2): 391-430.
Dave, D. and S. Mukerjee (2011). "Mental Health Parity Legislation, Cost-Sharing and Substance-Abuse Treatment Admissions." Health Economics **20**(2): 161-183.
Dusetzina, S. B., E. Basch and N. L. Keating (2015). "For Uninsured Cancer Patients, Outpatient Charges Can Be Costly, Putting Treatments Out Of Reach." Health Affairs **34**(4): 584-591.
Dutra, L., G. Stathopoulou, S. L. Basden, T. M. Leyro, M. B. Powers and M. W. Otto (2008). "A meta-analytic review of psychosocial interventions for substance use disorders." Am J Psychiatry **165**(2): 179-187.
Freedman, S., H. Lin and K. Simon (2015). "Public health insurance expansions and hospital technology adoption." Journal of Public Economics **121**: 117-131.
Garthwaite, C. L. (2012). "The Doctor Might See You Now: The Supply Side Effects of Public Health Insurance Expansions." American Economic Journal-Economic Policy **4**(3): 190-215.
Golberstein, E., S. H. Busch, R. Zaha, S. F. Greenfield, W. R. Beardslee and E. Meara (2015). "Effect of the Affordable Care Act's young adult insurance expansions on hospital-based mental health care." Am J Psychiatry **172**(2): 182-189.
Hamersma, S. (2013). The Effects of Medicaid Earnings Limits on Earnings Growth among Poor Workers. The B.E. Journal of Economic Analysis & Policy. **13:** 887.
Horwitz, J. R. (2005). "Making Profits And Providing Care: Comparing Nonprofit, For-Profit, And Government Hospitals." Health Affairs **24**(3): 790-801.
Jena, A. B. and D. P. Goldman (2011). "Growing Internet Use May Help Explain The Rise In Prescription Drug Abuse In The United States." Health Affairs **30**(6): 1192-1199.
Jensen, G. A. and M. A. Morrisey (1999). "Employer-sponsored health insurance and mandated benefit laws." Milbank Q **77**(4): 425-459.
Kaestner, R. and K. I. Simon (2002). "Labor market consequences of state health insurance regulation." Industrial & Labor Relations Review **56**(1): 136-159.
Kaiser Family Foundation (2014). 2014 Employer Health Benefits Survey. Menlo Park, CA, Kaiser Family Foundation.
Kline, P. (2011). "The impact of juvenile curfew laws on arrests of youth and adults." American Law and Economics Review: ahr011.
Kolstad, J. T. and A. E. Kowalski (2012). "The impact of health care reform on hospital and preventive care: Evidence from Massachusetts." Journal of Public Economics **96**(11-12): 909-929.
Kunz, F. M., M. T. French and S. Bazargan-Hejazi (2004). "Cost-effectiveness analysis of a brief intervention delivered to problem drinkers presenting at an inner-city hospital emergency department." J Stud Alcohol Drugs **65**(3): 363.
Lo Sasso, A. T. and T. C. Buchmueller (2004). "The effect of the state children's health insurance program on health insurance coverage." Journal of Health Economics **23**(5): 1059-1082.
Lu, M. and T. G. McGuire (2002). "The Productivity of Outpatient Treatment for Substance Abuse." The Journal of Human Resources **37**(2): 309-335.
Maclean, J. C. and B. Saloner (2016). "Substance use treatment: Evidence from Massachusetts healtcare reform." Health Economics **Accepted**.

Martinotti, G., V. Carli, D. Tedeschi, M. Di Giannantonio, A. Roy, L. Janiri and M. Sarchiapone (2009). "Mono- and polysubstance dependent subjects differ on social factors, childhood trauma, personality, suicidal behaviour, and comorbid Axis I diagnoses." Addictive Behaviors **34**(9): 790-793.
McGinty, E. E., S. H. Busch, E. A. Stuart, H. A. Huskamp, T. B. Gibson, H. H. Goldman and C. L. Barry (2015). "Federal Parity Law Associated With Increased Probability Of Using Out-Of-Network Substance Use Disorder Treatment Services." Health Affairs **34**(8): 1331-1339.
Meara, E., E. Golberstein, R. Zaha, S. F. Greenfield, W. R. Beardslee and S. H. Busch (2014). "Use of hospital-based services among young adults with behavioral health diagnoses before and after health insurance expansions." JAMA Psychiatry **71**(4): 404-411.
Melnick, G. A. and K. Fonkych (2008). "Hospital Pricing And The Uninsured: Do The Uninsured Pay Higher Prices?" Health Affairs **27**(2): w116-w122.
National Council of State Legislatures. (2015). "State laws mandating or regulating mental health benefits." Retrieved May 27, 2015, from http://www.ncsl.org/research/health/mental-health-benefits-state-mandates.aspx.
Office of National Drug Control Policy (2012). What America's Users Spend on Illegal Drugs, 2000-2006. Washington, DC, Executive Office of the President.
Pacula, R. L., J. F. Chriqui and J. King (2003). Marijuana Decriminalization: What does it mean in the United States? NBER Working Paper Series. N. B. o. E. Research. Cambridge, MA, National Bureau of Economic Research.
Pacula, R. L., D. Powell, P. Heaton and E. Sevigny (2013). Assessing the Effects of Medical Marijuana Laws on Marijuana and Alcohol Use: The Devil is in the Details. NBER Working Paper Series. Cambridge, MA, National Bureau of Economic Research.
Pacula, R. L., D. Powell, P. Heaton and E. L. Sevigny (2015). "Assessing the Effects of Medical Marijuana Laws on Marijuana Use: The Devil is in the Details." Journal of Policy Analysis and Management **34**(1): 7-31.
Popovici, I. and M. T. French (2013). Economic Evaluation of Substance Abuse Interventions: Overview of Recent Research Findings and Policy Implications. Addictions: A comprehensive guidebook. B. S. McCrady and E. E. Epstein. Oxford, U.K., Oxford University Press. **2**.
Rajkumar, A. S. and M. T. French (1997). "Drug abuse, crime costs, and the economic benefits of treatment." Journal of Quantitative Criminology **13**(3): 291-323.
Reuter, P. and H. Pollack (2006). "How much can treatment reduce national drug problems?" Addiction **101**(3): 341-347.
Richman , B. D., M. A. Hall and K. A. Schulman (2012). "Overbilling and Informed Financial Consent — A Contractual Solution." New England Journal of Medicine **367**(5): 396-397.
Richter, K. P., W. S. Choi, R. M. McCool, K. J. Harris and J. S. Ahluwalia (2004). "Smoking cessation services in U.S. methadone maintenance facilities." Psychiatr Serv **55**(11): 1258-1264.
Saloner, B., Y. A. Akosa, J. C. Maclean and B. Le Cook (2016). "Access to health insurance and utilization of public sector substance use treatment: Evidence from the Affordable Care Act dependent coverage provision." Health Economics **Accepted**.
Saloner, B. and B. Cook (2014). "An ACA Provision Increased Treatment For Young Adults With Possible Mental Illnesses Relative To Comparison Group." Health Aff (Millwood) **33**(8): 1425-1434.
Saloner, B., D. Polsky, G. M. Kenney, K. Hempstead and K. V. Rhodes (2015). "Most Uninsured Adults Could Schedule Primary Care Appointments Before The ACA, But Average Price Was $160." Health Affairs **34**(5): 773-780.

Silverman, E. and J. Skinner (2004). "Medicare upcoding and hospital ownership." Journal of Health Economics **23**(2): 369-389.
Sloan, F., J. Mitchell and J. Cromwell (1978). "Physician participation in state Medicaid programs." J Hum Resour **13 Suppl**: 211-245.
Sloan, F. A., G. A. Picone, D. H. Taylor Jr and S.-Y. Chou (2001). "Hospital ownership and cost and quality of care: is there a dime's worth of difference?" Journal of Health Economics **20**(1): 1-21.
Sommers, B. D., E. K. Arntson, G. Kenney and A. M. Epstein (2013). "Lessons from early Medicaid expansions under health reform: interviews with Medicaid officials."
Starr, S. B. (2002). "Simple Fairness: Ending Discrimination in Health Insurance Coverage of Addiction Treatment." The Yale Law Journal **111**(8): 2321-2365.
Stewart, D., M. Gossop and J. Marsden (2002). "Reductions in non-fatal overdose after drug misuse treatment: results from the National Treatment Outcome Research Study (NTORS)." Journal of Substance Abuse Treatment **22**(1): 1-9.
Substance Abuse and Mental Health Services Administration (2010). Results from the 2009 National Survey on Drug Use and Health: Volume I. Summary of National Findings. Rockville, MD, Substance Abuse and Mental Health Services Administration. **1**.
Substance Abuse and Mental Health Services Administration (2013). National Expenditures for Mental Health Services and Substance Abuse Treatment, 1986–2009. Rockville, MD, Substance Abuse and Mental Health Services Administration. **HHS Publication No. SMA-13-4740**.
Substance Abuse and Mental Health Services Administration (2014). Results from the 2013 National Survey on Drug Use and Health: Summary of National Findings. Rockville, MD, Substance Abuse and Mental Health Services Administration.
Swensen, I. D. (2015). "Substance-abuse treatment and mortality." Journal of Public Economics **122**(0): 13-30.
Tello-Trillo, D. S. (2016). Effects of Losing Public Health Insurance on Healthcare Access, Utilization and Health Outcomes: Evidence from the TennCare Disenrollment. 6th Biennial Conference of the American Society of Health Economists, Ashecon.
Terza, J. V. (2002). "Alcohol abuse and employment: a second look." Journal of Applied Econometrics **17**(4): 393-404.
The Beer Institute (2012). The Brewer's Almanac 2012. T. B. Institute. Washington, DC.
University of Kentucky Center for Poverty Research (2015). State Level Data of Economic, Political, and Transfer Program Information for 1980-2014. U. o. K. C. f. P. Research. Lexington, KY.
Wen, H., J. R. Cummings, J. M. Hockenberry, L. M. Gaydos and B. G. Druss (2013). "State parity laws and access to treatment for substance use disorder in the united states: Implications for federal parity legislation." JAMA Psychiatry **70**(12): 1355-1362.
Wen, H., J. M. Hockenberry and J. R. Cummings (2014). The Effect of Substance Use Disorder Treatment Use on Crime: Evidence from Public Insurance Expansions and Health Insurance Parity Mandates, National Bureau of Economic Research.
Wolfers, J. (2006). "Did unilateral divorce laws raise divorce rates? A reconciliation and new results." American Economic Review **96**(5): 1802-1820.