EVALUATING THE STATEWIDE EFFECTS OF HIFA WAIVERS ON SUBSTANCE USE DISORDER TREATMENT

An Undergraduate Research Scholars Thesis

by

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Submitted to the Undergraduate Research Scholars program at
Texas A&M University
in partial fulfillment of the requirements for the designation as an

UNDERGRADUATE RESEARCH SCHOLAR

Approved by Research Advisor: Dr. Jennifer L. Doleac

May 2019

Major: Statistics
Economics

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ABSTRACT

Evaluating the Statewide Effects of HIFA Waivers on Substance Use Disorder Treatment

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In 2010, the Affordable Care Act (ACA) was signed into effect by former President Barack Obama. The act had the intention of expanding Medicaid and making healthcare more affordable and accessible for Americans by drastically overhauling previous U.S. healthcare regulation. Although the magnitude of the changes proposed by the ACA were one-of-a-kind, the concept of healthcare expansion was not unique to the ACA. Back in 2001, the Bush Administration gave states the ability to expand healthcare coverage on their own terms through the Health Insurance Flexibility and Accountability (HIFA) Demonstrative Initiative. The initiative allowed states to pay for their healthcare expansion by rolling back healthcare package benefits and increasing sharing costs. Using HIFA waivers, a total of four states implemented programs that expanded coverage to additional substance use disorder (SUD) susceptible populations. With this change, more people in these states now had health care coverage, which meant that in theory, more people had access to mental and behavioral health services.

To determine whether these HIFA waivers have caused a significant change in the treatment rates for people with SUDs, estimates for states with HIFA waivers were compared to states without said waivers. These estimates were tracked from 2001 to 2008 through a fixed-effects model to determine whether there was a marked long-term difference associated with

healthcare expansion through HIFA. According to these figures, there is evidence to suggest that the Bush Administration's HIFA waivers had mixed effects on SUD treatment numbers depending on the admission type.

DEDICATION

This paper is dedicated to all my friends and family who have provided unconditional love and support throughout this journey. Completing a thesis was never something I could have done alone, so I'd like to take this time to show my gratitude. I'd like to start by thanking a few people by name, starting with my mother. She raised me to be hard-working and determined, teaching me to never back down from a challenge. Without her sacrifices, I wouldn't be where I am today, so to her I owe my success.

I'd also like to thank John and Vivian for their unwavering encouragement. They always gave me the motivation I needed to push through and finish.

Last but not least, I'd like to thank Rhett. By helping me, he's learned more about healthcare waivers than he'd probably ever want to know. His ability to discuss and, more importantly, listen to me talk about my thesis has helped me convert rough ideas into pages of content. He, and many others, have helped me more than they will ever know.

ACKNOWLEDGEMENTS

First and foremost, I'd like to Dr. Jennifer Doleac for her guidance and support throughout this entire process. Writing a thesis is an inherently challenging undertaking, but her help made such a lengthy and arduous task possible. Throughout this process, she was always there to tell me what I was doing right, but most importantly, tell me what I was doing wrong. With her expertise, I was able to combine both of my academic backgrounds to produce a thesis that utilized both an economic and statistical perspective. Thanks to her, she made my first, and hopefully not last, thesis a reality.

I'd like to also thank the Department of Statistics and the Department of Economics for providing me with the knowledge and skills necessary to carry out my thesis to completion. I'd like to additionally thank the Department of Economics for selecting me as an EUROP scholar and pairing me with an excellent mentor. Finally, I would also like to thank the LAUNCH: Undergraduate Research Office for providing me with the opportunity to pursue independent research through their URS program.

NOMENCLATURE

ACA	Affordable Care Act
FPL	Federal Poverty Level
HIFA	Health Insurance Flexibility and Accountability
(S)CHIP	(State) Children's Health Insurance Program
SUD	Substance Use Disorder
TEDS	Treatment Episode Data Set

CHAPTER I

INTRODUCTION

The National Institute on Drug Abuse defines drug addiction as a mental illness that often co-occurs with other mental disorders (NIDA 2010). In the case of alcohol abuse, addiction and externalizing mental disorders such as oppositional-defiant disorder and conduct disorder are strongly associated with one another, producing additional challenges for treatment (Kessler 2004). Studies have also shown that comorbid disorders are more chronic than isolated disorders, as those with a dual diagnosis often report a more severe and persistent history with mental issues and/or substance abuse.

Despite the clinical severity of said comorbidity, the US legal system punishes the misuse of drugs/illicit substance with legal consequences (Miller & Spratt 2010). Instead of treating drug addicts as sufferers of debilitating mental illnesses, they are often treated as criminals engaging in willful misconduct. Drug addiction remains undifferentiated from substance abuse and is often treated wholly as a social issue than a mental one. To put things into perspective, for every dollar spent on drug abuse, 95% goes towards funding the legal punishments, compared to the 2% that pays for prevention and treatment (Larsen 2014.)

In recent times, steps have been taken to expand the availability of substance use disorder (SUD) treatment[1]. In 2010, the ACA was signed into place by former President Barack Obama, defining "mental health and substance use disorder services" as an essential health benefit (Center for Consumer Information and Insurance Oversight 2011). By law, health insurance

[1] From this point onward, drug addiction/abuse will be referred to as a "substance use disorder".

providers were now required to cover said services in the hopes of expanding the nationwide availability of behavioral health resources.

However, this is not the first time that a president has attempted to expand healthcare coverage to accommodate those with mental illnesses. In 2002, former President George W. Bush created the New Freedom Commission on Mental Health (NFCMH) to come up with healthcare recommendations that would improve the lives of those with serious mental illness and/or emotional disturbances (NFCMH 2003). In the commission's report to the president, they stated that the current mental healthcare system was "fragmented, disconnected, and often inadequate." The commission believed that a fundamental transformation to the existing system was necessary to connect Americans to the appropriate resources they need to treat their mental health illnesses.

To make this change possible, the President's New Freedom Initiative rolled out a new HIFA waiver option (NASUAD 2005). Under Section 1115 of the Social Security Act, states could implement new healthcare programs to cover individuals who are traditionally not covered by Medicaid. In general, the most vulnerable populations are covered under Medicaid, such as low-income families with dependents and pregnant women under a certain FPL (Wen et al. 2017). By using HIFA waivers, states could expand Medicaid coverage to those who fell outside these categories.

Although considered a vulnerable population by some, people with SUDs are often ineligible for Medicaid (Wen et al. 2017). Individuals with SUDs are more likely to be unemployed or in part-time job with low wages. As a result, these people cannot receive health care plans meant for full-time employees and often lack the income to afford coverage through

the private healthcare market. Due to this all-too-familiar scenario, those with SUDs are often overrepresented in the uninsured population and go untreated.

HIFA attempted to bridge this treatment gap by covering more individuals who were beneath the FPL but were not traditionally covered under Medicaid. In theory, by allowing for flexibility in Medicaid/SCHIP eligibility requirements, more individuals with SUDs could get insured and subsequently seek out treatment. However, an empirical policy analysis is required to figure out whether HIFA was successful in achieving its goal.

CHAPTER II

BACKGROUND

The Health Insurance Flexibility and Accountability (HIFA) Demonstrative Initiative was introduced in August 4, 2001 as another type of Section 1115 waiver (Ryan 2002). Enacted during the Bush Administration, HIFA sought to increase healthcare coverage amongst the uninsured by making healthcare more accessible and affordable. These waivers States were given the authority to modify Medicaid and State Children's Health Insurance Program (SCHIP) eligibility requirements so they could include childless adults and other populations that were not typically covered under these programs (Atherly et al. 2012). To assist those who still did not qualify for public health insurance after the eligibility expansions, HIFA also allowed individuals with incomes under 200% of the FPL to receive public subsidies for private health insurance premiums.

As a Section 1115 waiver, HIFA waivers were required to be budget neutral to prevent increased federal government spending (Artiga 2009). As such, states had a few options in how they funded their HIFA waiver-based expansions. With the initial passage of the HIFA Demonstrative Initiative, States were also authorized to use unspent SCHIP funds to expand healthcare to different categories of adults, including childless adults (Baumrucker 2008). However, when the Deficit Reduction Act of 2005 was enacted, states could no longer create new waivers that would pay for the coverage for childless adults using unused SCHIP funds. From that point forward, states could now only pay for HIFA waiver expansions by imposing enrollment caps, providing different benefit packages for different eligible populations, and increasing cost-sharing charges (Coughlin and Zuckerman 2008).

Since the introduction of the HIFA Demonstrative Initiative in 2001, 14 states have implemented HIFA waiver-based program healthcare expansions (Atherly et al. 2012). These programs ran from 2001 to 2014, with Arizona being the first state to expand healthcare coverage through a HIFA waiver and New Mexico being the last state to have their waiver expire. The nature of these HIFA waiver programs vary wildly from state to state, with certain states only targeting one specific population (such as pregnant women or disabled working adults) while others expand eligibility to broader categories (NASUAD 2002). However, despite the differences between each state's HIFA waiver program, one thing is certain: all of them succeeded in expanding coverage to previously uninsured individuals.

CHAPTER III

DATA

Dependent Variable: SUD Admission Rate

State-level SUD admission numbers from Treatment Episode Data Set (TEDS) were used to quantify the impact of HIFA waiver expansion programs. To determine whether the impact was the same for treatments related to different drugs/illicit substances, admissions for alcohol, marijuana, heroin, cocaine, amphetamines (including meth), and non-heroin opiates/synthetics were evaluated separately in addition to total admission numbers. Furthermore, to account for the difference in population between states, admission numbers were converted into rates, per 100,000 population.

Independent Variable: "HIFA State"

Between 2001 and 2008, a total of 15 states received approval for HIFA waivers (Wen et al. 2017). However, for the purposes of analyzing the effect of HIFA waiver expansions on SUD treatment, not all of these states are relevant. When determining the effects of HIFA waivers on SUD treatment, only a select number of states count as "HIFA states". In this paper, the following states are considered HIFA states: Arizona, Illinois, Maine, and New Mexico.

Out of the 15 states who received HIFA waivers, only eight had expansion programs that were comprehensive enough to be analyzed thoroughly (Atherly et al. 2012). From these eight states, Michigan, Oregon, Colorado, and Oklahoma, were not chosen as HIFA states as they had policies that were not beneficial to individuals with SUDs (Wen et al. 2017). Michigan's expansion program failed to include specialty SUD treatment for adults, while Oregon had to retract SUD benefits due to a fiscal crisis. On the other hand, Colorado and Oklahoma had

focused primarily on expanding healthcare to specialized populations (pregnant women and working disabled adults, respectively.)

Therefore, for the purposes of this study, the only states that were counted as HIFA states were the ones that implemented long-term programs that affected this paper's target population: individuals with SUDs. A basic overview of these states' HIFA waiver programs can be seen in the table below.

Table 1. "HIFA States"

State	Year(s)	Targeted Populations
Arizona	2001 – 2011	• Pregnant women • Childless Adults • Parents of Medicaid and SCHIP eligible children
Illinois	2002 – 2007	• Childless adults • Children of low-income families • Parents of SCHIP eligible children
Maine	2002 – 2013	• Childless adults
New Mexico	2005 – 2014	• Childless working adults • Uninsured working parents of Medicaid and SCHIP eligible children

Other Controls

When testing to determine the effect of HIFA waivers on SUD admission rates, there are two sources of variability to keep in mind: time-invariant state heterogeneity and national trends

in SUD admission rates. Therefore, a state fixed effects variable was added to control for the inherent differences in SUD admissions between states, and a year fixed effects variable was added to account for the changes in national SUD admissions that occur with time.

CHAPTER VI

RESULTS

Fixed Effects Model

To determine whether HIFA waivers caused a significant change in treatment rates for SUD, statewide admission rates were analyzed in a two-way fixed effects model. This model therefore estimates the within-state changes in admission rates, when HIFA waivers are adopted, controlling for national trends in SUD treatment. As mentioned in the previous chapter, Arizona, Illinois, Maine, and New Mexico were defined as "HIFA states" for the analysis. Admission numbers published by SAMHSA from their Treatment Episode Data Set (TEDS) were analyzed over a 14-year period from 1998 to 2012 to create the following model:

$$Admissions/100k = \beta_0 + \beta_1(HIFA)_{s,t} + \rho_s + \tau_t$$

where the subscript s denotes state and t denotes year. To isolate and estimate the effect that HIFA waivers have on state SUD admissions, ρ_s and τ_t were included in the model to control for state fixed effects and year fixed effects, respectively. β_0 represents the number of SUD admissions a state has regardless of their HIFA status, while β_1 represents the effect that an active HIFA waiver has on SUD admission rates. $HIFA_{s,t}$ is an indicator variable that is equal to 1 when state *s* has an active HIFA waiver in year *t*. Otherwise, $HIFA_{s,t}$ is equal to 0.

This base model was used to estimate the main effect of HIFA waivers on the following SUD admission rates: alcohol, marijuana, heroin, cocaine, amphetamines (including meth), non-heroin opiates/synthetics, and total. The main effect estimators were calculated using SUD admission rates from 44 states. Alabama, Alaska, Mississippi, Rhode Island, Tennessee, and West Virginia were excluded entirely from the model due to missing and/or incomplete data.

The following table describes the main effect estimator, standard error, and p-value associated with the effect of HIFA waivers on different types of admission rates.

Table 2. Main Effect of HIFA Waiver on Admission Rate Type

Admission Type	**Main Effect Estimator**	**Std. Error**	**p-Value**
Alcohol	150.3622**	30.8541	1.4057×10^{-6}
Marijuana	19.6208*	9.1225	0.0319
Heroin	136.5632**	20.8413	1.2174×10^{-10}
Cocaine	25.8764**	7.0090	2.4285×10^{-4}
Amphetamines	111.6387**	16.6483	4.6296×10^{-11}
Non-heroin opiates/synthetics	-45.2675**	10.4206	1.6419×10^{-5}
Total	346.6155**	47.7668	1.2327×10^{-12}

Note: The following subscripts indicate statistical significance at certain levels of significance:

** indicates statistical significance for $\alpha = 0.01$

* indicates statistical significance for $\alpha = 0.05$.

As seen in Table 2, HIFA waivers have a statistically significant effect on all admission types with a level of significance of 0.05. The exact magnitude and direction of said effect varies with admission type, but the results indicate that HIFA waivers have a positive effect on the majority of SUD treatment rates, excluding those related to treatment for non-heroin opiates/synthetics.

As indicated by the main effect estimators above, HIFA waivers are associated with an increase in treatment rates for six admission types: alcohol, marijuana, heroin, cocaine, amphetamines, and total admissions. The main effect estimators for these admission types range from approximately 19 per 100,000 marijuana admissions to 346 per 100,000 total admissions. Therefore, the change in SUD admissions associated with the implementation of a HIFA waiver ranges from a 0.0196 percentage point (pp) increase to a 0.3466 pp increase for all admission types excluding non-heroin opiates/synthetics.

On the other hand, the main effect estimator associated with non-heroin opiate/synthetic SUD admissions indicates that, on average, a state with an active HIFA waiver will experience a 0.0453 pp decrease in non-heroin opiate/synthetic admissions. The existence of a negative main effect estimator indicates that HIFA does not always have a positive effect on admission rates. In fact, there is evidence to suggest that HIFA waivers have varying effects on SUD treatment rates based on the type of substance.

To put these numbers into context, the table below shows the average treatment admission rates for each substance taken over a 14-year period.

Table 3.1. Average SUD Treatment Rates for Different Substances (1998-2012)

Year	Alcohol	Marijuana	Heroin	Cocaine	Amphet-amines	Non-heroin opiates/ synthetics	Total
1998	452.7955	113.3864	113.3864	94.3409	89.6591	8.9545	839.1364
1999	445.5455	117.3182	130.8182	87.1818	86.8636	10.0682	831.5227
2000	428.2500	123.9318	128.7955	84.5455	90.0000	13.2727	825.5909
2001	412.8409	129.3182	111.6136	80.5455	88.6818	17.8636	830.0000
2002	410.4545	133.2045	100.5227	82.5455	100.4318	21.0000	848.2955
2003	391.4318	130.2045	104.1591	86.2955	113.4318	25.0455	831.9091
2004	384.8636	132.1364	108.8182	86.3636	106.5455	30.2273	839.7273
2005	396.5000	138.8864	112.1364	92.5227	118.0227	36.8864	881.7500
2006	415.2955	140.4545	102.2727	96.6136	112.2046	44.4318	901.3864
2007	429.2273	140.6364	113.4773	91.1591	105.5227	53.3864	907.0682
2008	446.4545	153.4773	116.4545	81.6591	125.9318	65.5682	930.2045
2009	440.6136	158.2045	124.7273	63.7273	110.0000	73.4091	919.0682

Table 3.2. Average SUD Treatment Rates for Different Substances (1998-2012) [cont.]

Year	Alcohol	Marijuana	Heroin	Cocaine	Amphet-amines	Non-heroin opiates/ synthetics	Total
2010	399.7727	150.2955	129.7045	50.6591	111.9546	80.5909	854.5000
2011	383.1591	146.3636	134.8864	48.4318	103.3182	90.9091	850.0227
2012	362.9091	136.3182	128.1818	40.6136	104.6364	87.4773	826.7273

The average SUD admission rates for different substance types across a 14-year timespan puts the main effect estimators into perspective. For example, the 150.3622 increase in alcohol admissions per 100,000 is a 33.68% to 41.43% increase when put into context. This range is derived from taking the highest and lowest admission rates for each admission type from Table 3.1 and 3.2 and then dividing these values with the relevant main effect estimator from Table 2. Using this same convention, the other main effect estimators can be put into context as follows:

- A 19.6208 increase in marijuana treatment admissions per 100,000 represents an increase between 12.40% and 17.30%.
- A 136.5632 increase in heroin treatment admissions per 100,000 represents an increase between 101.24% and 135.85%.
- A 25.8764 increase in cocaine treatment admissions per 100,000 represents an increase between 26.78% and 63.71%.
- A 111.6387 increase in amphetamine treatment admissions per 100,000 represents an increase between 88.65% and 128.52%.
- A 45.2675 decrease in non-heroin opiate/synthetic treatment admissions per 100,000 represents a decrease between 49.79% and 505.53%.
- A 346.6155 increase in total treatment admissions per 100,000 represents an increase between 37.26% and 41.98%.

Therefore, the estimated effects of HIFA waivers on SUD admissions rates are both statistically and contextually significant.

Coefficient Plot

Although the two-way fixed effects model established whether HIFA waivers had a substantial effect on SUD admission rates, it did not explain whether the effect of HIFA varied

throughout a program's lifespan. Looking at the coefficient associated with the presence of an active HIFA waiver is not enough to determine whether the effectiveness of a HIFA waiver program decreases, stays constant, or increases over time.

To determine whether the effect of HIFA waivers changed throughout the duration of its corresponding program, SUD admission rates were once again evaluated through a two-way fixed effects model. However, a new variable was added to the fixed effects model to measure the change in SUD admission rates for each subsequent year leading up to and after the initial implementation of a HIFA waiver expansion program. These coefficients captured the effect of HIFA waivers six years before their initial implementation to nine years after they had taken effect. A visualization of this year-by-year analysis can be seen in the figures below.

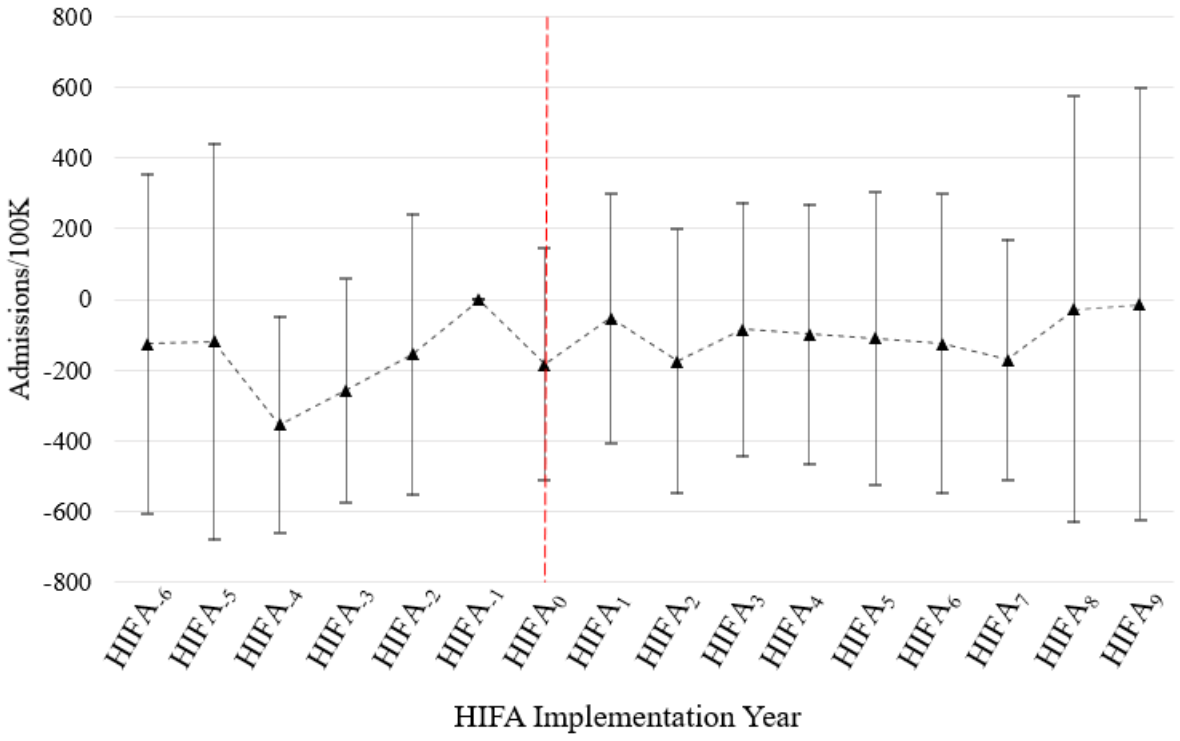

Figure 1. Coefficient Plot for HIFA Implementation Year (Total Admission)

Based on the main effect estimator for total admissions from Table 2 in the previous subsection, there is evidence to suggest that the implementation of a HIFA waiver caused a significant increase in total SUD admissions. Figure 1 supports this claim as indicated by the overall increase in SUD admissions that occur after the initial year of HIFA implementation, which is denoted by the red dashed line. However, when broken down into individual years, the difference in year-by-year admission rates before and after HIFA waiver implementation is not as drastic as one may expect. A significant drop in SUD admission rates occurs four years before the implementation of HIFA waiver, which might explain the substantial increase in SUD admission rates associated with the overall presence of an active HIFA waiver.

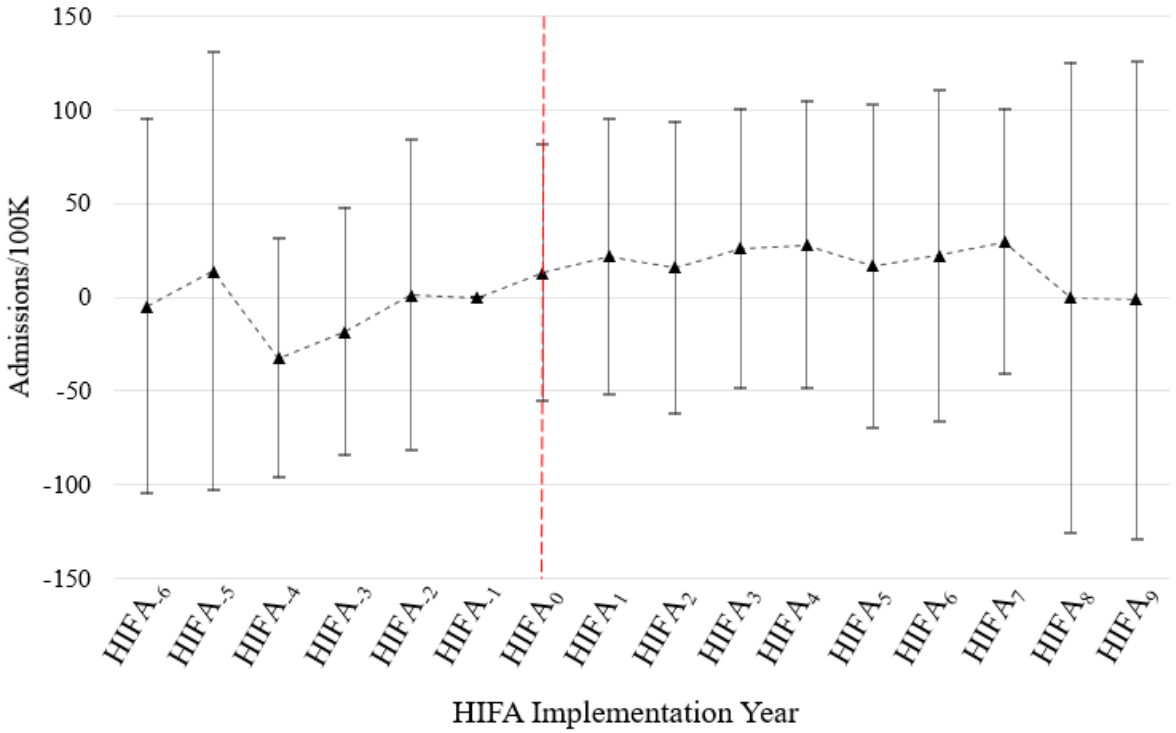

Figure 2. Coefficient Plot for HIFA Implementation Year (Marijuana Admissions)

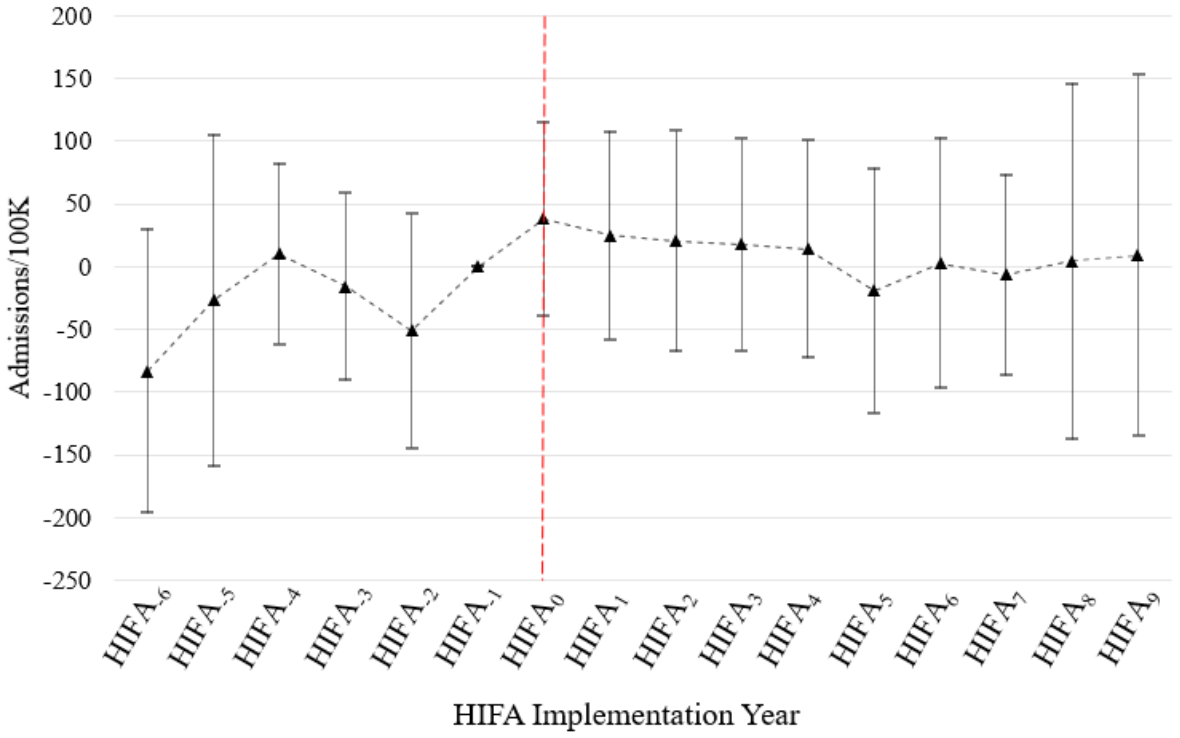

Figure 3. Coefficient Plot for HIFA Implementation Year (Amphetamine Admission)

A similar occurrence happens in the coefficient plots for marijuana and amphetamine treatment admission rates. There is a significant drop in marijuana and amphetamine admissions at four and two years before HIFA implementation, respectively. Once a HIFA waiver is implemented, both types of admissions experience a somewhat drastic increase in treatment rates. According to Figure 2, there is a smaller but still positive increase in marijuana admissions per year, while Figure 3 shows that amphetamine admissions seem to stay constant once a HIFA waiver is in effect. Both figures provide evidence that HIFA waivers cause an almost immediate increase in admission rates when first implemented. However, the same plots show that the change in admission rates for subsequent years is much less drastic.

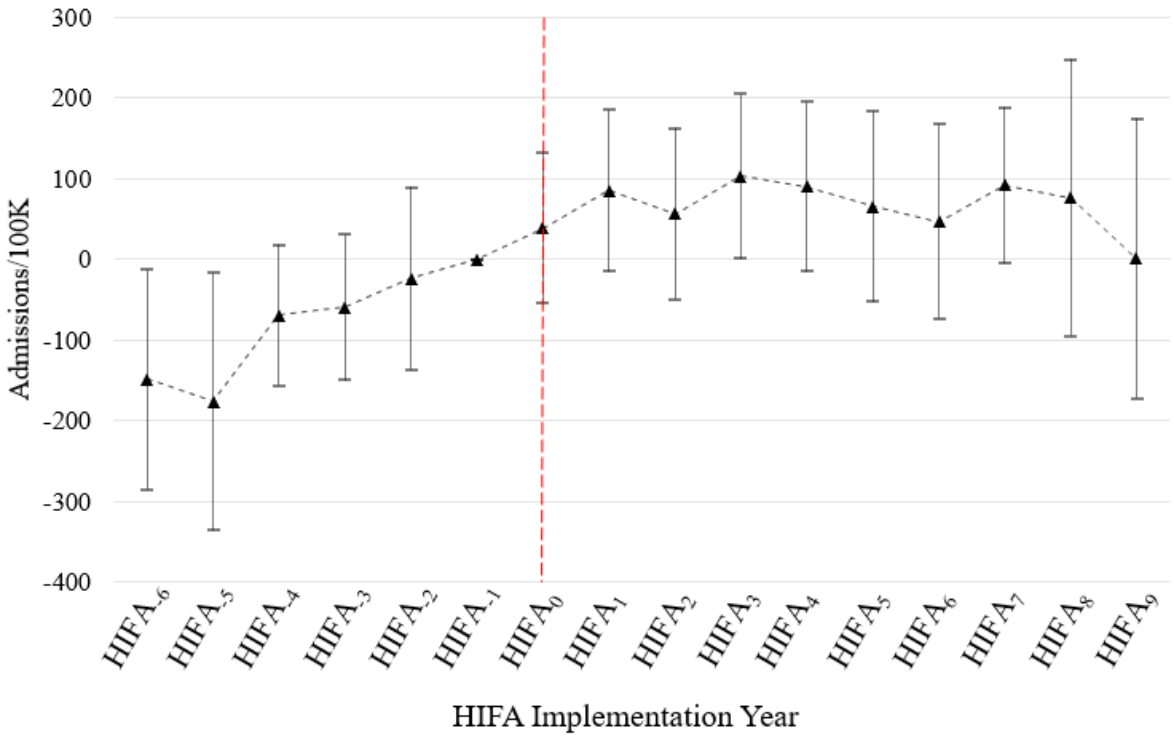

Figure 4. Coefficient Plot for HIFA Implementation Year (Alcohol Admissions)

On the other hand, the coefficient plot for alcohol admissions suggests that a different underlying variable might be responsible for the increase in SUD admission rates. The main effect estimator associated with alcohol admissions from Table 2 was positive, suggesting that HIFA waivers caused an increase in alcohol treatment admissions. Figure 4 does not contradict this claim but hints at the existence of an underlying phenomena due to the difference in admission trends before and after HIFA implementation. As indicated by Figure 4, there is a gradual increase in alcohol-related admissions leading up to a HIFA waiver's initial implementation. Once said waiver is in effect, it seems that admission rates stay relatively constant, hovering around 50 to 100 admissions per 100,000 for the next eight years. The stark difference in pre- and post-implementation trends suggests that some other factor is at play.

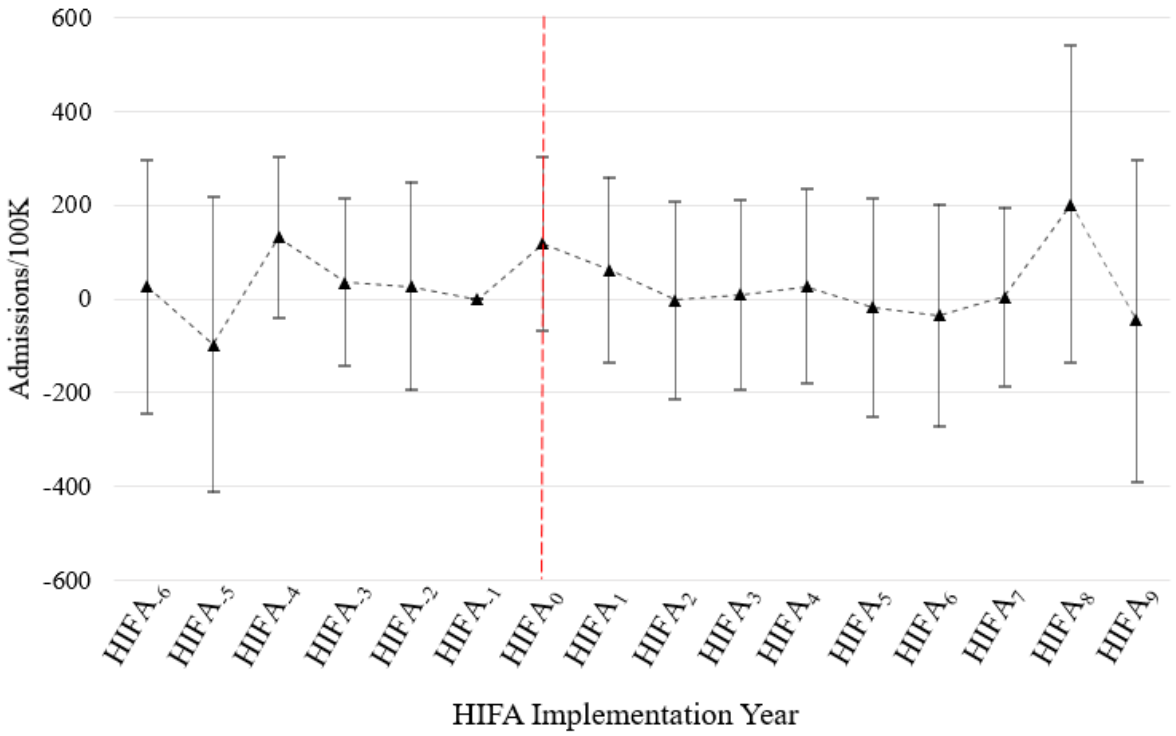

Figure 5. Coefficient Plot for HIFA Implementation Year (Heroin Admissions)

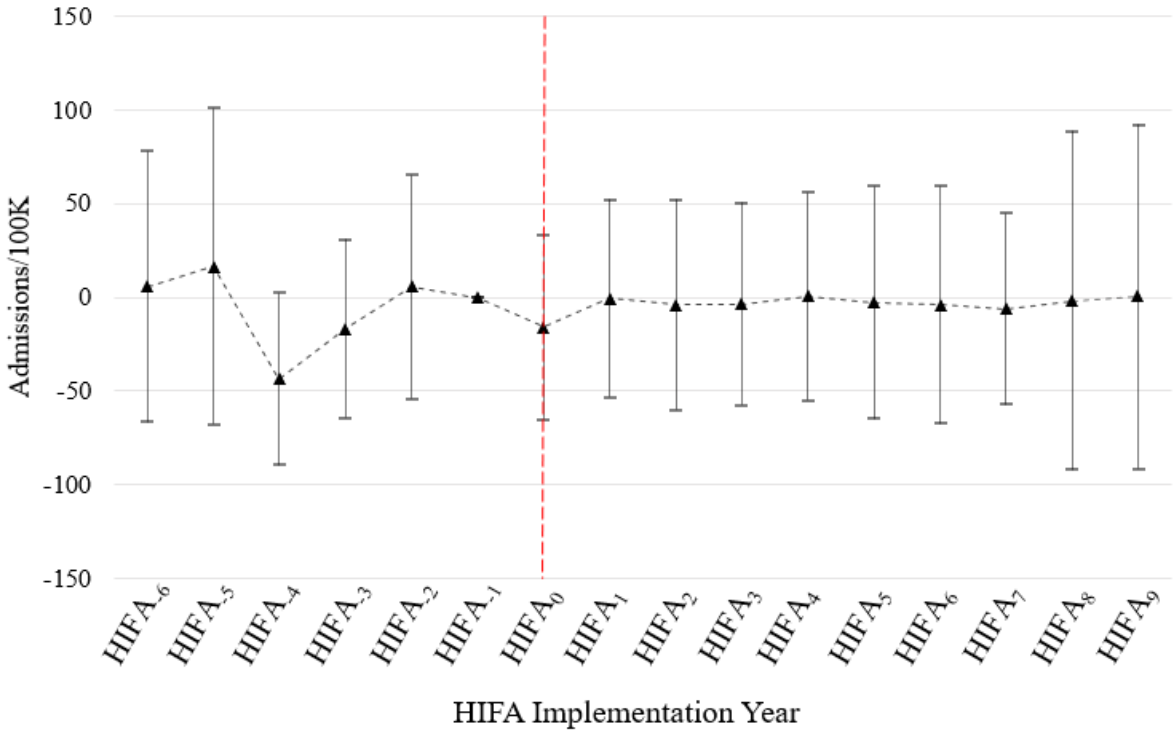

Figure 6. Coefficient Plot for HIFA Implementation Year (Cocaine Admissions)

According to Figure 5, heroin admissions experience a sizable drop five years before the implementation of HIFA, while Figure 6 shows that cocaine admissions experience a drop four years before HIFA is implemented. As indicated by the main effect estimators from Table 2, on average, heroin and cocaine admissions increase with the presence of an active HIFA waiver. However, when the effect of HIFA waiver programs are evaluated at individual years, the year-by-year change in these SUD admissions before and after implementation is not as drastic. In fact, these plots indicate that the effect of HIFA on SUD admission rates is primarily influenced by short-term decrease in the years leading up to the start of a HIFA waiver program.

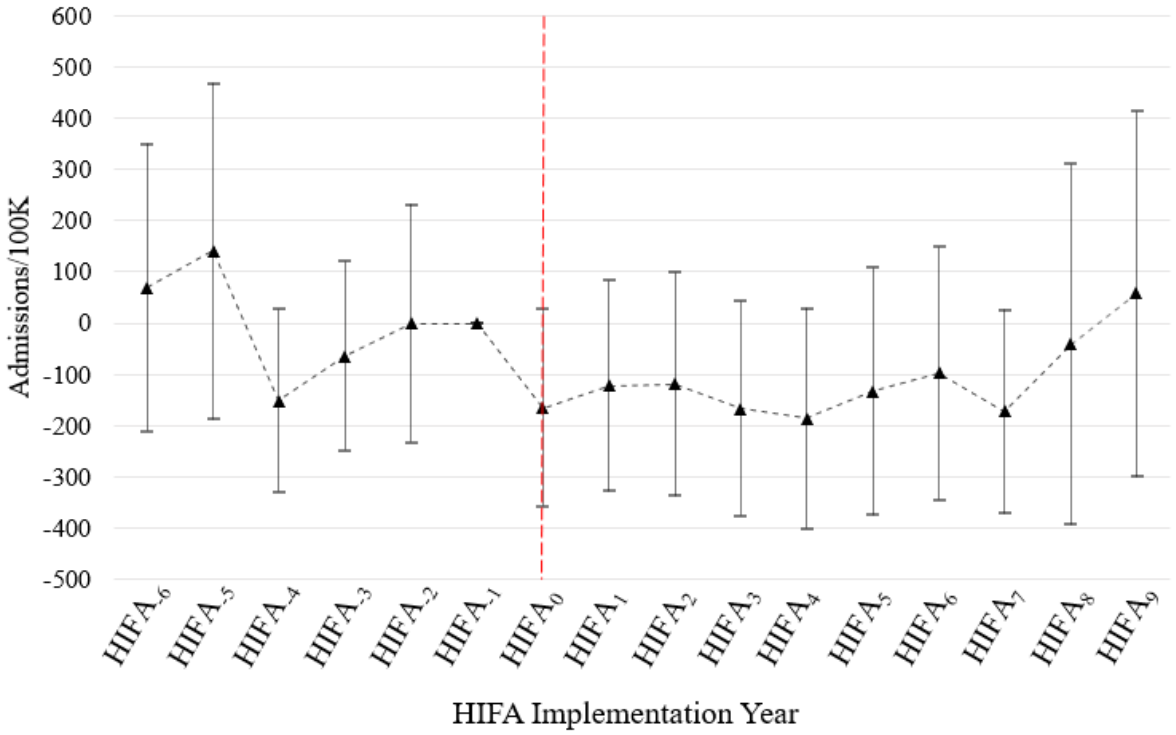

Figure 7. Coefficient Plot for HIFA Implementation Year (Non-Heroin Opiate/Synthetics Admission)

Similar to alcohol admissions, there is evidence to suggest that non-heroin opiate/synthetic admissions are influenced by more than just HIFA waivers. In Figure 7, there is a decreasing trend in admissions that occurs in the years leading up the implementation of a HIFA waiver. However, once a HIFA waiver is implemented, it appears as though the admission rates stay relatively constant until the seven-year mark. The difference in before and after admission rates could indicate the existence of an underlying variable that stabilizes admission rates after HIFA is implemented.

CHAPTER V

DISCUSSION

Since the main effect estimators associated with HIFA waivers were statistically significant for all admission types, there is evidence to suggest that the implementation of HIFA waivers influenced SUD admission rates. According to these same main effect estimators, HIFA waivers had a positive effect on the majority of admission rates, with the exception of non-heroin opiates/synthetics. The magnitude of these effects varies significantly, with the lowest being a 12.40% to 17.30% increase in alcohol admissions to a 49.79% and 505.53% decrease in non-heroin opiate/synthetic admissions.

The negative main effect estimator associated with non-heroin opiate/synthetic admissions implies that HIFA waivers caused a decrease in the number of people seeking treatment for said substances. A possible reason for this occurrence may be an increased access to prescription opiates such as OxyContin and Vicodin (NIDA n.d.). By expanding healthcare coverage to previously uninsured individuals through HIFA, more people now had easier access to doctors who could prescribe opiates. It is possible that some individuals took this opportunity to abuse prescription opiates, which could lead to lower treatment rates. However, this is no more than an educated guess, as confirming this theory would require more in-depth research on whether the implementation of HIFA caused a significant increase in the number of non-heroin opiate prescriptions.

As discussed previously, HIFA waivers were created as a potential solution to America's inadequate mental health problem. With recommendation from the New Freedom Commission on Mental Health, the Bush administration created HIFA waivers to expand healthcare to more

people in hopes of improving the lives of those with serious mental illnesses and/or emotional disturbances, such as substance use disorder. HIFA has already been shown to have statistically significant large-scale effects, but to further increase the effectiveness of HIFA waivers and, by extension, other expansionary healthcare waivers, more research must be done.

Making more populations eligible for public health insurance programs like Medicaid is one approach to expanding SUD treatment, but increasing public awareness of such initiatives and reducing the negative perception associated with treatment are other viable approaches. Using policy-based expansion to increase SUD treatment rates is insufficient on its own, since individuals could be unaware of such resources or may be hesitant in seeking treatment due to social/cultural stigma. Quantifying public awareness and perception is possible through surveys and online search engine queries. Advertising these programs and emphasizing the public benefits they produce may be influential in further increasing SUD treatment rates, which is the fundamental goal of expansionary policies like HIFA.

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