



April 14, 2022

Current Policy Perspectives

Did the Medicaid Expansion Crowd Out Other Payment Sources for Medications for Opioid Use Disorder? Evidence from Rhode Island

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Using information from the all-payer claims database for Rhode Island covering more than three-quarters of health insurance enrollees in the state from April 2011 through May 2019, this paper offers new measures of the association between the Medicaid expansion and the rate of receipt of buprenorphine and methadone for opioid use disorder (OUD). These robust measures adjust for the extent to which new Medicaid payments for these medications that started in 2014 crowded out payments from either non-Medicaid insurance or from non-insurance subsidies for the treatment of opioid abuse. We find that crowding out was nontrivial but incomplete for either buprenorphine or methadone, such that the Medicaid expansion in Rhode Island appears to have enabled many patients to access medications for OUD for the first time. These findings offer support for the expansion of Medicaid in states that have not already done so.

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The authors thank Samuel Makikalli, Morgan Klaeser, David Schramm, and Melissa Gentry for research assistance and data analysis. They are grateful to Brian Boates, Jeff Thompson, Darcy Saas, Delia Sawhney, Jones George, and Bret Fontecchio for their help in acquiring and securing the data. For their many helpful suggestions, the authors thank J. Catherine Maclean and other participants at the 10th annual conference of the American Society of Health Economists, along with Hefei Wen, J. Frank Wharam, Katherine Carman, and Hao Yu. The authors also wish to thank Jamieson Goulet of the Rhode Island Department of Behavioral Health, Developmental Disabilities, and Hospitals for answering policy-related questions.

The views expressed herein are those of the authors and do not indicate concurrence by the Federal Reserve Bank of Boston, the principals of the Board of Governors, or the Federal Reserve System.

Data for this analysis were obtained through an approved request to HealthFacts RI, Rhode Island's all-payer claims database, as administered by the Rhode Island Department of Health (RIDOH). Data were obtained for the period April 2011 through May 2019. RIDOH is not responsible for the authors' analysis, opinions, and conclusions contained in this document.

1. Introduction

Since January 2014, a total of 38 states and the District of Columbia have enacted Medicaid expansion as part of an optional provision of the Patient Protection and Affordable Care Act (ACA). Missouri was the most recent state to do so, having made expanded coverage effective as of July 2021.¹ Research has linked Medicaid expansion with diverse benefits such as increased health insurance enrollment rates among low-income adults, improved management of chronic diseases, and increased rates of screening for certain cancers.² Nonetheless, opponents of Medicaid expansion argue that the programs are too costly, straining state and federal budgets, and that they offer little value to their intended beneficiaries given existing private insurance options.³

Medicaid expansion has also been touted as an important policy tool for addressing the ongoing opioid use crisis in the United States. Fueled by the proliferation of highly potent synthetic opioids and by the COVID-19 pandemic, opioid-related mortality in the United States reached an all-time high in recent data: More than 75,000 opioid-related deaths were recorded in the 12-month period from May 2020 through April 2021, up from roughly 50,000 during the 2019

¹ Missouri's expansion went into effect in October 2021, but coverage was granted retroactively to July 2021. See Kaiser Family Foundation, "Status of State Medicaid Expansion Decisions: Interactive Map," November 19, 2021, <https://www.kff.org/medicaid/issue-brief/status-of-state-medicaid-expansion-decisions-interactive-map/>.

² Papers that find benefits from Medicaid expansion include Simon, Soni, and Cawley (2017), Courtemanche et al. (2017), Sommers et al. (2016), Cole et al. (2017), and Sammon et al. (2018), as well as a meta-analysis by Mazurenko et al. (2018). However, Miller and Wherry (2017) find no significant effects of Medicaid expansions on self-rated health status.

³ For arguments against Medicaid expansion see, for example, https://www.columbiamissourian.com/opinion/local_columnists/steve-spellman-heres-an-argument-against-medicaid-expansion/article_e95061f0-cc1f-11ea-b9a9-77d2a5ba437f.html and <https://thefga.org/wp-content/uploads/2019/04/MedEx-Crowd-Out-Paper-DRAFT7.pdf>, accessed February 7, 2022.

calendar year.⁴ Opioid use disorder (OUD)⁵ not only contributes to premature mortality but also impairs social functioning and carries external costs such as increased crime, disease transmission, and reduced productivity (Wall et al. 2000; Florence, Luo, and Rice 2021).

Medicaid plans typically offer generous coverage of proven treatments for OUD and target populations that tend to be at greater risk of suffering from the disorder (Substance Abuse and Mental Health Services Administration 2018). Recent research shows that Medicaid expansion resulted in increased use of Medicaid as a means of payment for both buprenorphine and methadone, the two most common medications used in the treatment of opioid use disorder (Wen et al. 2017; Clemans-Cope, Epstein, and Kenney et al. 2017; Meinhofer and Witman 2018). One study also associates Medicaid expansion with a significant decrease in opioid overdose deaths (Kravitz-Wirtz et al. 2020). Although these medications have been credited with promoting abstinence and saving lives,⁶ many or even most patients who might benefit from them are not receiving them (Saloner and Karthikeyan 2015). Among other barriers to proper treatment for OUD, inadequate health insurance coverage has been cited as a significant contributing factor (Volkow et al. 2014).⁷

⁴ For a compendium of reports on recent national and state trends in opioid-related mortality, opioid use disorder, and related policy responses, see the American Medical Association's issue brief from November 2021, "Nation's Drug-related Overdose and Death Epidemic Continues to Worsen," <https://www.ama-assn.org/system/files/2020-12/issue-brief-increases-in-opioid-related-overdose.pdf>, accessed December 17, 2021. For earlier data on opioid-related mortality, see Kaiser Family Foundation (2020).

⁵ The *DSM-5 (Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition) defines an OUD as "a problematic pattern of opioid use that leads to serious impairment or distress." (American Psychiatric Association 2013). The condition is also characterized as a chronic brain disease rooted in neurobiology (Volkow et al. 2014).

⁶ The evidence on the health and social benefits of treating OUD with methadone and buprenorphine is voluminous. See, for example, Connery (2015), Gibson et al. (2008), Evans et al. (2019), and Larochelle et al. (2018).

⁷ See Kendal Orgera and Jennifer Tolbert, "Key Facts about Uninsured Adults with Opioid Use Disorder," *Kaiser Family Foundation*, July 15, 2019, <https://www.kff.org/uninsured/issue-brief/key-facts-about-uninsured-adults-with-opioid-use-disorder/>, accessed March 14, 2022.

While previous studies are suggestive, data limitations have led to inconclusive findings concerning whether Medicaid-expansion states achieved a net increase in the number of patients receiving buprenorphine or methadone relative to non-expansion states. Notably, Maclean and Saloner (2019) find that combined admissions to specialty treatment facilities for all substance use disorders—including but not limited to OUD—did not increase significantly in the aggregate owing to Medicaid expansion; they determined instead that payments for such admissions merely shifted to Medicaid and away from other government subsidies (whether federal, state, or local) for the uninsured. It is important to gain more insight into the issue of payment substitution in light of the claim that Medicaid merely substitutes for or “crowds out” private insurance and other payment sources.

Using information from the all-payer claims database (APCD) for Rhode Island covering more than three-quarters of health insurance enrollees in the state for the period April 2011 through May 2019, this paper offers new measures of the association between the Medicaid expansion and the rate of receipt of Medicaid-paid buprenorphine and methadone for OUD in Rhode Island. These more robust measures capture and adjust for the extent to which new Medicaid payments for medication for opioid use disorder (MOUD) starting in 2014 crowded out payments from non-Medicaid insurance and/or from non-insurance subsidies for the treatment of opioid abuse.

Our analysis shows that, following Rhode Island’s implementation of the ACA and Medicaid expansion in January 2014, Medicaid payments for buprenorphine did substitute for or crowd out other forms of payment to a nontrivial extent. Most of the crowding out reflects substitution away from private insurance rather than from non-insurance government subsidies. Nonetheless, even after excluding those who merely switched payment sources after the ACA implementation and netting out a predicted counterfactual increase, we observe a large and statistically

significant increase in the average quarterly number of Rhode Island adults receiving buprenorphine for OUD under Medicaid in the 2014–2015 period compared with the 2012–2013 period. In the case of methadone, we find that crowding out of commercial insurance was negligible, while substitution for non-insurance subsidies with Medicaid appears to have been substantial. Again, we observe an economically significant net increase in methadone patients enabled by Medicaid following the ACA implementation. We estimate further that the ACA and Medicaid expansion enabled as many as 1,475 Rhode Island residents to initiate treatment with either methadone or buprenorphine in 2014 and 2015 alone, not including people who held health insurance prior to 2014.

This paper serves as a complement to previous studies that examine variation in state-level outcomes in relation to differences in state-level policies (Wen et al. 2017; Maclean and Saloner 2019; Meinhofer and Witman 2018; Clemans-Cope, Epstein, and Kenney 2017; Antwi, Moriya, and Simon et al. 2015). Unlike the studies employing state-year panel data, our study follows individual patients across insurance carriers, which enables us to identify confirmed cases of crowding out of non-Medicaid insurance. Our preferred measures capture the actual number of patients receiving MOUD, whereas most previous studies use measures such as the number of buprenorphine prescriptions or the number of treatment episodes, either of which is likely to overstate the number of unique patients receiving medications for OUD. Finally, we produce combined measures of receiving either buprenorphine or methadone, in addition to measures of receiving each drug separately, as trends in the use of a single medication for OUD might be misleading. Owing to data limitations, we do not count patients receiving naltrexone for OUD, but previous research suggests that these numbers are very low for the period we consider (Alderks 2017).

One limitation of our approach is that Rhode Island implemented the broader ACA simultaneously with the Medicaid expansion, and so any changes in outcomes observed after January 2014 may reflect the combined impact of multiple policy measures and not just the provisions of the Medicaid expansion. More fundamentally, the associations we estimate cannot be interpreted necessarily as causal effects, because we cannot observe the outcomes that would have occurred in the absence of Rhode Island’s ACA implementation.

In a companion paper (Burke et al. 2021), we test (and reject) the hypothesis that incumbent Medicaid enrollees in Rhode Island, who entered the plan prior to January 2014, were hurt by the expansion in terms of their chances of utilizing buprenorphine. Those results, together with the current findings, suggest that Rhode Island’s implementation of the ACA and Medicaid expansion was associated with widespread gains in the utilization of life-saving medications for treating OUD. Rhode Island has been among the states hardest hit by the opioid epidemic. Therefore, due to the share of its population in need of such treatments, expanding access to MOUD in the state is likely to have yielded above-average gains.⁸

The fiscal impact of Rhode Island’s Medicaid expansion is beyond the scope of this paper. However, previous research into Medicaid’s impact on state budgets finds that the net cost of Medicaid expansion to states has typically fallen well below the direct costs of the health expenditures of expansion enrollees, as states receive federal funds to pay for most of those

⁸ Since the early 2000s, the state has experienced above-average rates of opioid-associated mortality, and in 2018 its opioid-related overdose death rate was 10th highest in the United States (Burke and Sullivan 2020). The state saw a resurgence in opioid-related mortality in 2020 after experiencing a slight decline in deaths in 2019. See Prevent Overdose Rhode Island’s “Overdose Death Data,” <https://preventoverdoseri.org/overdose-deaths/>, accessed March 8, 2022.

benefits and reap savings through, for example, reduced payments to hospitals for uncompensated care.⁹

2. Background

2a. Rhode Island's Medicaid Program and Coverage of MOUD

Rhode Island implemented the Medicaid expansion in January 2014 simultaneously with the federal Patient Protection and Affordable Care Act (ACA). Under the expansion, eligibility for Medicaid was extended to all non-disabled adults aged 18 to 64 (with or without children) with incomes at or below 138 percent of the federal poverty level (FPL). Previously, aside from low-income disabled or elderly individuals qualifying for Medicaid, eligibility was restricted to parents with family income up to 175 percent of the FPL and to pregnant women and children in families with income up to 250 percent of the FPL.¹⁰ Parents with family incomes between 138 percent and 175 percent of the FPL lost eligibility for Medicaid in Rhode Island in 2014, but that loss was offset by the availability of subsidized, exchange-based insurance under the ACA.

Including adults and children, Medicaid enrollment in Rhode Island swelled nearly 20 percent from fiscal 2014 (July 2013 through June 2014) to fiscal 2015.¹¹ As of 2019, 24 percent of Rhode Island's population, including children, was covered by Medicaid.¹² In our basic analysis sample from the APCD (described below), adult enrollment in Medicaid increased 59 percent in

⁹ See, for example, the Commonwealth Fund's issue brief "The Impact of Medicaid Expansion on States' Budgets," <https://www.commonwealthfund.org/publications/issue-briefs/2020/may/impact-medicaid-expansion-states-budgets>; and Manatt Health's report "Assessing the Fiscal Impact of Medicaid Expansion Following the Enactment of the American Rescue Plan Act of 2021," <https://www.manatt.com/insights/white-papers/2021/assessing-the-fiscal-impact-of-medicaid-expansion>. Both sources were accessed February 14, 2022.

¹⁰ For an extended discussion of Rhode Island's actions in advance of the ACA implementation and Medicaid expansion, see Holahan et al. (2012).

¹¹ See https://ballotpedia.org/Effect_of_the_Affordable_Care_Act_in_Rhode_Island, accessed June 2, 2021.

¹² See <https://files.kff.org/attachment/fact-sheet-medicaid-state-RI>, accessed June 2, 2021.

the first quarter of the expansion compared with the last pre-expansion quarter, as seen in Figure 1.

In addition to offering states the option of expanding Medicaid, the ACA imposed new measures on most health insurance plans that aimed to expand coverage for the treatment of substance use disorders (SUD), such as stronger mental health parity requirements and the inclusion of SUD treatment as an essential health benefit (see, for example, Wen et al. 2013). In Rhode Island, such measures would have mattered primarily for non-Medicaid plans, as the state's Medicaid plans already offered comprehensive coverage of SUD treatment well before January 2014. More important for our analysis, Rhode Island's Medicaid plans have offered full coverage of both methadone and buprenorphine for OUD, and coverage of complementary behavioral therapies, since at least 2012.^{13,14}

In July 2013, Rhode Island implemented the Medicaid health homes model for the treatment of high-cost, high-need patients, such as those suffering from substance use disorders, serious mental illness, or other chronic conditions in combination with SUDs or mental illness. The health homes model offers a coordinated approach to the care of such patients, integrating medical and behavioral treatments with the provision of long-term services and supports, as a

¹³ For more information about this coverage, see Burns et al. (2016) and https://eohhs.ri.gov/sites/g/files/xkgbur226/files/Portals/0/Uploads/Documents/Pharmacy/pdl_list.pdf.

¹⁴ Under federal law, all patients receiving methadone or other medications for OUD at a specialty opioid treatment facility must receive concurrent psychosocial treatment (such as cognitive behavioral therapy). See, for example, <https://www.samhsa.gov/medication-assisted-treatment/medications-counseling-related-conditions>, accessed March 11, 2022. No such federal law applies to patients receiving buprenorphine for OUD by prescription from an office-based practitioner. In particular, Medicaid enrollees in Rhode Island being treated with prescription buprenorphine for OUD are not required to undergo psychosocial treatment, but Medicaid enrollees in several other states are required to receive counselling while taking buprenorphine (Substance Abuse and Mental Health Services Administration 2018).

way to improve the quality of care and reduce costs.¹⁵ All specialized opioid treatment programs (OTPs) in Rhode Island were required to adopt the health homes model, while office-based buprenorphine prescribers were not part of the program (Clemans-Cope et al. 2017).¹⁶ This added policy measure may have boosted the chance that an OUD patient received methadone starting in July 2013 and thereafter, and so it will be taken into consideration when interpreting outcomes pertaining to methadone in particular.

2b. Subsidized non-insurance treatment for OUD in Rhode Island

Since fiscal 1993, states have had the option of applying for federal funds to prevent and treat substance use disorders under the Substance Abuse Prevention and Treatment Block Grant program (SABG), and Rhode Island has consistently received such funds.¹⁷ As a result, since 1993, low-income Rhode Islanders not eligible for Medicaid have been able to access SABG funds to pay for medications and associated behavioral therapy for OUD at any of the state's licensed opioid treatment programs (OTPs). As SABG funds in Rhode Island can be used only for treatment at an OTP, and not for direct prescription purchases, most if not all Rhode Islanders using such funds to treat OUD would be receiving methadone rather than either buprenorphine or naltrexone, because the amount of buprenorphine and naltrexone dispensed at OTPs is low.¹⁸ In

¹⁵ For more information, see Centers for Medicare & Medicaid Services, Health Home Information Resource Center Fact Sheet, January 2019, <http://www.chcs.org/media/HH-Fact-sheet-January-2019.pdf>.

¹⁶ For more information about Rhode Island's OTP Health Homes model, see <https://www.medicaid.gov/state-resource-center/innovation-accelerator-program/iap-downloads/reducing-substance-use-disorders/mat-key-elements-ri.pdf>.

¹⁷ For more information on the SABG block grant program, see <https://www.samhsa.gov/grants/block-grants/sabg> and https://bhddh.ri.gov/sections/block_grant.php.

¹⁸ Our data do not allow us to observe buprenorphine or naltrexone receipt at an OTP, as there are no consistent codes for such in the medical claims for this outcome. See Cathie E. Alderks, "Trends in the Use of Methadone, Buprenorphine, and Extended Release Naltrexone at Substance Abuse Treatment Facilities: 2003–2015 (Update)," the CBHSQ Report, August 22, 2017.

Rhode Island, the income limit for eligibility to receive such funds was 133 percent of the federal poverty level (FPL) prior to 2015 and was raised to 200 percent of the FPL starting in 2015.¹⁹

Separate from the block grants, Rhode Island has an additional funding stream to pay for substance abuse treatment for individuals suffering from mental illness but who do not qualify for Medicaid. These funds are obtained as part of Rhode Island's Medicaid global waiver agreement, first established in 2009, which gives the state enhanced flexibility in its use of federal funds in exchange for capping the federal government's contribution to Rhode Island's Medicaid expenses (Rhode Island Executive Office of Health and Human Services 2012). Apart from adding to the number of uninsured individuals who would have been able to receive subsidized MOUD in Rhode Island prior to and/or after the Medicaid expansion, this program creates some issues in our data set that are discussed in the methods section below.

As many more individuals became eligible for Medicaid under the expansion, fewer would have needed to rely on non-insurance subsidies to pay for methadone and related treatments for OUD. Indeed, evidence presented below suggests that there was a significant shift away from non-insurance subsidies and toward Medicaid as a payment source for methadone. Nonetheless, when considering aggregate data that capture all payment sources, we still find that Rhode Island's implementation of the ACA and Medicaid expansion was associated with a net increase in the number of methadone patients.

¹⁹ This information was provided to us in an email exchange from January 2022 with an administrator at the Rhode Island Department of Behavioral Healthcare, Developmental Disabilities, and Hospitals.

3. Data and Sample Selection

HealthFacts RI is the official name of the all-payer claims database (APCD) for the state of Rhode Island.²⁰ The Federal Reserve Bank of Boston entered into a data-use agreement with the Rhode Island Department of Health, and the research received institutional review board approval. The database in our possession is organized at the monthly frequency and runs from April 2011 through May 2019, although we use a narrower range of dates in the analysis, for reasons discussed below. The term “all-payer claims database” is somewhat of a misnomer, as plans that insure fewer than 3,000 Rhode Island residents or employer-based plans that insure fewer than 3,000 individuals who work in Rhode Island (regardless of where they live) are not required to report to the APCD. Since March 2016, self-insured health plans covered by the Employee Retirement Income Security Act (ERISA) have not been required to report to the APCD.²¹ Treatments and medications paid for out of pocket or using non-insurance subsidies are not recorded in the data. As a result of these reporting limitations, our sample captures most, but not all, Rhode Island residents with health insurance in any given month. In fiscal 2012, HealthFacts RI enrollees represented 76 percent of all insured Rhode Island residents; by fiscal 2015 that figure had increased to 88 percent, but by fiscal 2018 it had fallen to 77 percent.²²

For each health insurance enrollee observed in a given month, the database includes their age, gender, and residential Zip code; information about their medical and/or pharmacy insurance

²⁰ Currently, 18 states have a full APCD, and 12 more either have a voluntary APCD not mandated by legislation, or they are still in the process of establishing an APCD. See the Agency for Healthcare Quality and Research for more information, <https://www.ahrq.gov/data/apcd/index.html>.

²¹ In March 2016, the Supreme Court ruled that self-insured (commercial) plans could not be mandated to provide claims data to state APCD systems. See SCOTUSblog, “Gobeille v. Liberty Mutual Insurance Company,” <https://www.scotusblog.com/case-files/cases/gobeille-v-liberty-mutual-insurance-company/>, accessed October 7, 2021.

²² These estimates are based on average monthly APCD enrollment per fiscal year (for fiscal years 2012 through 2018) as compared with external estimates of the total number of insured Rhode Island residents for the same fiscal years. See Burke and Sullivan (2020) for details.

plans; and extensive information from insurance claims pertaining to health-care services and prescription medications received by the individual in that month.²³ The data have been de-identified to protect confidentiality, but individual enrollees and health-care providers can be followed over time using numerical identifiers. Data on race and ethnicity are not available.

Buprenorphine prescriptions are identified in the pharmacy claims file using National Drug Code (NDC) numbers and are restricted to formulations approved for the treatment of opioid use disorder.²⁴ Claims that were denied payment by the insurer (as indicated in the data) are excluded. Receipt of methadone to treat opioid use disorder is identified in the medical claims file based on the procedure code H0020 from the Healthcare Common Procedure Coding System (HCPCS).²⁵

To construct the analysis sample—called the “basic sample”—we remove observations in which an enrollee was under age 18 or had a non-Rhode Island Zip code. We also remove all observations of anyone who is ever observed with the aid category code “costs not otherwise matchable,” a marker that refers to uninsured aid recipients whose records are nested within the APCD.²⁶ We then identify individuals with at least six consecutive (non-excluded) monthly observations in HealthFacts RI at any time from April 2011 through May 2019, regardless of

²³ To cite just a few data items, we observe detailed codes and descriptions of all procedures, treatments, and diagnoses; standardized drug codes and the quantity supplied for each prescription; payment information such as the enrollee’s copay and the full amount charged for each service or medication; and information about the provider that rendered the services.

²⁴ The list of NDC codes for the set of included buprenorphine formulations can be obtained from the authors upon request.

²⁵ The HCPCS is a standardized coding system maintained jointly by the American Medical Association (AMA) and Centers for Medicare & Medicaid Services (CMS). See https://www.cms.gov/Medicare/Coding/MedHCPCSGenInfo/HCPCS_Coding_Questions, accessed March 8, 2022.

²⁶ The APCD records with this aid category are mistakenly labeled as a subset of Medicaid fee-for-service enrollees, as the program was administered by the state’s Medicaid program. Some individuals observed with this aid category are also intermittently observed as Medicaid enrollees, but their health records in the APCD appear erratic and unreliable. Dropping these observations results in somewhat smaller estimates of the increases in buprenorphine and methadone utilization following the Medicaid expansion than we would obtain if the observations were retained.

their insurance payer. We restrict the time interval to the period January 2012 through December 2015 for analyzing buprenorphine trends, and to the period January 2012 through September 2015 when analyzing methadone trends. We chose the shorter time period for methadone because the data contain evidence of redactions or “scrubbing” of methadone treatments starting in the fourth quarter of 2015, and therefore including the later dates could result in the distortion of the time trends of interest.²⁷ Outcomes are aggregated to the quarterly frequency to smooth monthly fluctuations and for comparability with previous research (such as Wen et al. 2017) that considers quarterly outcomes for all or part of the same time period.

The basic sample, considering the period 2012Q1 through 2015Q4, includes a total of 778,084 unique individuals, roughly 19 percent of whom had Medicaid as their dominant plan during that time period.²⁸ The sample used for the analysis of methadone (ending in 2015Q3) includes 769,761 unique individuals, of whom 18 percent had Medicaid as their dominant plan during the relevant time period.

4. Methods

Because Rhode Island implemented the Medicaid expansion simultaneously with other provisions of the ACA in January 2014, any changes in health-care utilization in the state after that month may have resulted from features of the Medicaid expansion specifically and/or owing to provisions of the broader ACA. In addition, there might have been changes in health-care

²⁷ The inferred redactions in our data set pertain to the insurer United Healthcare, which administers one of Rhode Island’s Medicaid managed care plans. Redactions are made by some insurers in order to comply with the Health Insurance Portability and Accountability Act (HIPAA). See, for example, “Patient Privacy and Document Redaction in Medical Contexts,” <https://caseguard.com/articles/patient-privacy-and-document-redaction-in-medical-contexts/>, accessed March 8, 2022.

²⁸ Those who have both Medicare and Medicaid are referred to as “dual eligible” and are not included as Medicaid enrollees. These individuals qualified for Medicare based on age or disability and also qualified for either full or partial Medicaid benefits based on their income. Medicare represents their primary insurance, and the Medicaid plan is used to pay for services covered only by Medicaid and/or to pay for out-of-pocket expenses not covered by Medicare. When all observations from January 2012 through December 2018 are considered, roughly 5 percent of the sample members are classified as dual eligible in most (more than half) or all of their observations.

utilization in Rhode Island starting in January 2014 even if the state had not implemented either the ACA or the Medicaid expansion. Moving forward, references to the ACA should be understood as including the Medicaid expansion. Furthermore, our analysis documents the associations between the ACA implementation and increases in Medicaid-paid MOUD treatments, but these can't necessarily be considered causal given the uncertainty surrounding our estimates of the counterfactual outcomes that would have occurred in Rhode Island absent the ACA and Medicaid expansion.

Figures 2 through 5 (and the accompanying Tables 2 through 4) illustrate our estimates of the association between Rhode Island's ACA implementation and the utilization of buprenorphine and/or methadone for opioid use disorder among Medicaid enrollees, before and after adjustments to account for crowding out of non-Medicaid insurance and other forms of payment. The figures show the raw number of Rhode Island Medicaid enrollees receiving a given medication in a given quarter, and the tables show results based on those raw numbers and expressed in terms of patients per 1,000 Rhode Island residents. The percentage changes in outcomes over time are based on the population-scaled numbers in order to control for any influence of changes in the state's population over time. However, the percentage changes in raw patient numbers are virtually identical to the changes in the scaled numbers.

The unadjusted estimates in a given figure (purple line or "Adjustment 0") count the number of unique patients in the basic sample who used Medicaid to pay for a given medication (depending on the exhibit) in at least one month in any given quarter. The first adjustment ("Adjustment 1") aims to eliminate cases of confirmed crowding out of non-Medicaid insurance by Medicaid insurance. Accordingly, this adjustment—which is too small to show in the case of methadone—excludes individuals who are first seen using Medicaid to pay for a buprenorphine prescription in

2014Q1 or later and who prior to 2014 received buprenorphine using either commercial insurance or Medicare.²⁹

Estimates labelled “Adjustment 2” in a given exhibit further exclude suspected cases of substitution to Medicaid from non-Medicaid payment sources that can’t be observed in the APCD, such as an APCD-exempt insurance plan, government subsidies, or cash.³⁰ We learned from staff members at the Rhode Island Executive Office of Health and Human Services that a large number of Medicaid expansion enrollees who received methadone in their first month on Medicaid had been treated with the drug previously using non-insurance subsidies, and that similar patterns may have occurred for buprenorphine as well. Accordingly, the Adjustment 2 estimates omit individuals who entered the basic sample in January 2014 or later and received a given OUD medication (using Medicaid as payment) in their very first month in the sample. This method is admittedly imperfect, as it may discard some individuals who did not actually receive methadone (or buprenorphine) before 2014 and may fail to discard others who did receive one of these medications previously. As indicated above, omitting individuals who are ever observed with the “costs not otherwise matchable,” aid category also aims to eliminate people who may have received MOUD using non-insurance subsidies before joining Medicaid under the expansion.

For the methadone and combined MOUD exhibits only, we apply an additional adjustment (Adjustment 3) that omits all the observations of individuals who switched from the state’s

²⁹ Most of the excluded individuals used commercial insurance to obtain buprenorphine prior to using Medicaid, but a small portion used Medicare insurance.

³⁰ The use of government subsidies to pay for buprenorphine is likely to have been uncommon in Rhode Island, for reasons noted above. Those paying in cash, as opposed to using insurance or subsidies, should not be considered cases of crowding out under the common understanding of that term, although some such cases might be captured by this method.

Medicaid fee-for-service plan to one of its Medicaid managed care (MCO) plans following the ACA implementation.³¹ Patterns in methadone receipt for such individuals suggest that many of them may have received methadone before January 2014, even though those treatments are not observed in the APCD.

Each figure also includes a dashed gray line showing the predicted number of Medicaid-paid buprenorphine (methadone, or any MOUD) recipients per quarter, based on a linear regression fitted to the actual quarterly 2012–2013 numbers and extrapolated to the 2014–2015 period.

These counterfactual predictions simply assume that, absent the state’s combined implementation of the ACA and Medicaid expansion, the number of Medicaid patients receiving a given treatment would have evolved (starting in 2014Q1) according to the estimated linear trend that prevailed on average during the eight quarters from 2012Q1 through 2013Q4. For either buprenorphine or methadone, the estimated pre-ACA trend is significantly positive and offers a close fit to the 2012–2013 data. To the extent that the true counterfactual growth rates in Medicaid-paid MOUD would have been greater (or smaller) than our predictions, our estimates of growth net of the counterfactuals would need to be adjusted downward (or upward) accordingly.³²

Findings from Wen et al. (2017) suggest that the path of buprenorphine prescriptions in non-expansion states conforms fairly closely to this counterfactual prediction in qualitative terms—if anything, the growth rate of buprenorphine prescriptions slowed modestly in the post-ACA

³¹ The switchers are those who were enrolled exclusively in the Medicaid fee-for-service plan prior to January 2014 and who were enrolled in a Medicaid managed care plan in the majority of their months in sample in 2014 and 2015.

³² In theory, one might estimate counterfactual growth in MOUD utilization in the 2014–2015 period by restricting the sample to those Medicaid enrollees who would have been eligible for Medicaid prior to the expansion, ignoring any new Medicaid enrollees who were eligible only as a result of the expansion. However, the data don’t allow us to separate those two types of enrollees, and furthermore it is well known that growth in “traditional” Medicaid enrollment was also influenced by the ACA rollout for a variety of reasons. See <https://www.kff.org/report-section/the-effects-of-medicaid-expansion-under-the-aca-updated-findings-from-a-literature-review-report/>.

period in non-expansion states, on average, relative to the path that would have been predicted based on the trend in those states in 2012 and 2013.³³ Nonetheless, the uncertainty surrounding the counterfactual outcomes for Rhode Island means that our results should be interpreted as associations rather than as the causal effects of ACA implementation.

Figure 5 shows estimates of MOUD *initiations* per quarter that involved payment with Medicaid, for the period from 2012Q1 through 2015Q3. An individual qualifies as initiating MOUD using Medicaid in a quarter if (a) that quarter includes the first month in which they received either buprenorphine or methadone using any form of payment, (b) the first such treatment entailed payment with Medicaid, and (c) the first month of treatment does not coincide with their initial month in the APCD.³⁴ Starting in 2014Q1, the figure shows MOUD initiations separately for Medicaid incumbents (observed to have held Medicaid insurance prior to January 2014) and for new Medicaid enrollees (first observed with Medicaid insurance in January 2014 or later).

5. Results

5a. Increases in Medicaid-Paid Buprenorphine and Methadone Patients Associated with the ACA and Medicaid Expansion in Rhode Island

Results in Figure 2 and Table 2 indicate that Rhode Island’s Medicaid expansion—comparing average quarterly outcomes in 2014 and 2015 with those in 2012 and 2013—was followed by a very large (roughly 85 percent) increase in the quarterly number of Rhode Island residents receiving buprenorphine paid for by Medicaid—considered either in raw terms or per 1,000 state residents.³⁵ Discounting patients who received buprenorphine before 2014 using non-Medicaid

³³ This statement is based on the data shown in Figure 1 of Wen et al. 2017.

³⁴ This refers to a patient’s first non-excluded observation in the sample, where inclusion requires being age 18 or older and residing in Rhode Island. The number of enrollees who received MAT in excluded observations that pre-date their included observations is negligible.

³⁵ All values refer to the number of Medicaid-paid buprenorphine recipients per quarter per 1,000 RI residents in the quarter, or averages of such a number over several quarters.

insurance, the latter estimate falls 12 percent, and excluding others who may have received the drug previously using unknown forms of payment reduces the number by an additional 7 percent. Finally, netting out the rise in Medicaid-financed buprenorphine patients that would have been expected based on the state's 2012–2013 trend, the increase in buprenorphine patients per 1,000 residents in the 2014–2015 period attributable to Rhode Island's Medicaid expansion lands at just under 28 percent.

Figure 3 and Table 3 pertain to methadone patients whose treatment was financed by Medicaid. In the unadjusted estimates, the average number of patients per quarter nearly doubled in the 2014–2015 period compared with the 2012–2013 period. Crowding out of commercial insurance is negligible and therefore is not shown separately. However, Medicaid enrollees who entered the sample in or after January 2014 and immediately commenced methadone treatment are likely to have previously had the treatment financed through block grant funds or other subsidies. When the latter types of patients are excluded from the analysis, the estimated increase in quarterly methadone patients (per 1,000 residents) enabled by the Medicaid expansion falls by nearly one-third. Omitting incumbent Medicaid enrollees who switched from the state's Medicaid fee-for-service plan to a Medicaid managed care plan—for reasons described above—shaves another small margin off of the estimated increase. After these adjustments are made and net of the predicted growth based on the pre-2014 trend, the increase in quarterly methadone patients (per 1,000 residents) financed by Medicaid that is associated with Rhode Island's ACA and Medicaid expansion comes to just under 33 percent.

Figure 4 and Table 4 consider the outcome of receiving any opioid-agonist MOUD (either buprenorphine or methadone) using Medicaid as payment. Before adjustments, the quarterly patient load shows a very large increase, and accounting for crowding out of non-Medicaid

insurance results in only a modest downward adjustment. However, eliminating likely cases of prior receipt of MOUD using unknown payment types deflates the estimate by a large margin. The most conservative or bottom-line estimate suggests that the ACA (including the Medicaid expansion) enabled a 27 percent increase in the quarterly average number of MOUD patients (per 1,000 residents) financed by Medicaid over the levels that would have arisen if pre-ACA trends had persisted.

Figure 5 shows quarterly initiations (defined above) of opioid-agonist MOUD paid for by Medicaid, separately for incumbent (pre-expansion) enrollees and those who entered Medicaid in January 2014 or later. All values exclude patients who either received or are suspected of having received MOUD using non-Medicaid payments prior to receiving MOUD with Medicaid. The 1,475 initiations among those who entered Medicaid in January 2014 or later (shown on the green line) represent an estimate of the number of first-time MOUD treatments paid for by Medicaid that were directly enabled by the ACA. These are upper-bound estimates, however, because some unknown number of the post-2014 enrollees would have enrolled in Medicaid and started MOUD even in the absence of the ACA. The spike in initiations among new enrollees in early 2014 suggests that there was pent-up demand for MOUD among previously uninsured patients. The decline in initiations among incumbent enrollees starting in mid-2014 most likely reflects the fact that the incumbent sample is capped by construction, so that over time there would have been fewer patients who had yet to take up treatment.

5b. Robustness Analysis: Evidence on MOUD in Rhode Island from Other Sources

The analysis above suggests that the ACA implementation and Medicaid expansion in Rhode Island enabled individuals to access MOUD who would not otherwise have received these medications, rather than resulting in a mere substitution of Medicaid for other forms of payment

for MOUD. However, the analysis so far is subject to the limitation that the APCD data omit uninsured patients and those with insurance plans that are exempt from reporting. As a result, some patients who have been flagged as first-time MOUD recipients under Medicaid in 2014 or later may have received similar treatments previously using forms of payment not captured in the data. Two other data sources help us to address this limitation, at least in the case of methadone treatments.

The first data set, obtained from the Rhode Island Department of Health, provides the total number of methadone recipients per month in the state from January 2012 through September 2015, regardless of payment source.³⁶ These data reveal that, in 2014 and 2015 compared with 2012 and 2013, the quarterly average number of methadone patients in Rhode Island increased by about 839 individuals (23 percent) in absolute terms, or by 11 percent relative to the estimated counterfactual increase that would have occurred absent the ACA (see Figure 6 and Table 5). Although this percentage increase is lower than the corresponding estimate of the increase in Medicaid-financed methadone alone—no doubt in part because it is calculated in relation to a larger base value—it offers robust evidence that the ACA was associated with a net increase in methadone patients when all forms of payment are considered. That is, increases in Medicaid-paid methadone were not fully offset by declines in methadone patients using other forms of payment. Furthermore, combined with the previous analysis, these data imply that roughly 88 percent of the total increase in methadone patients in Rhode Island following the ACA

³⁶ These data are available for the longer time period of April 2011 through May 2019, but we restrict the analysis here to the time period used so far elsewhere in the analysis.

implementation (through 2015Q3) can be accounted for by the increase in Medicaid patients alone.³⁷

The Treatment Episode Data Set: Admissions (TEDS-A) offers additional information on the prevalence of methadone treatments for OUD in Rhode Island. This source allows us to count the annual number of admissions to specialty facilities in Rhode Island for the treatment of opioid use disorder that would have included medication as part of the treatment.³⁸ The exact medication is not specified in the TEDS-A, but other data sources suggest that it would have been methadone in the large majority of cases.³⁹ These admissions are broken down by payment type and include patients using all types of payment sources. The number of admissions per year is most likely greater than the unique number of patients, as some patients may contribute more than one treatment episode per year.

Figure 7 shows the percentage of such admissions by payer type for the three largest payment sources, as well as total admissions per year summed over all payment types and averaged separately for the 2012–2013 and 2014–2015 periods. The data reveal that admissions paid for by Medicaid accounted for a much larger share in the post-ACA period than before, while the importance of other government payment sources (such as non-insurance subsidies) and out-of-pocket payments declined significantly. Although these patterns suggest that a large portion of

³⁷ This calculation is based on data shown in Table 5. The Medicaid-financed increase was estimated at 741 patients, and the observed all-payer increase was 839 patients. The ratio of the former to the latter is roughly 88 percent. The ratio would be very similar if instead we were to use estimates of the increases in patients (Medicaid and total, respectively) net of counterfactual increases.

³⁸ For the technical details on how admissions for OUD involving medications were identified in the data, see Burke (2019).

³⁹ According to the 2013 National Survey of Substance Abuse Treatment Services (N-SSATS), methadone was used in 96 percent of admissions for OUD including medications, whereas buprenorphine was used in only 3.7 percent of cases, and naltrexone in 0.10 percent. Buprenorphine prescriptions obtained outside of specialty facilities are not captured in the TEDS-A. See “National Survey of Substance Abuse Treatment Services (N-SSATS): 2013 Data on Substance Abuse Treatment Facilities,” https://www.samhsa.gov/data/sites/default/files/2013_nssats_rpt.pdf, accessed March 4, 2022.

the increase in Medicaid-paid admissions involving methadone was offset by declines in similar admissions paid for by other sources, the data also show that total admissions including medications (from all payment sources combined) increased significantly in 2014 and 2015, by 251 episodes or 12.2 percent.

In previous research using the TEDS-A, Meinhofer and Witman (2018) estimate that the Medicaid expansion (in states such as Rhode Island that offered Medicaid coverage of methadone) was associated with a net increase of 7 percent in per capita utilization of specialty treatment for OUD including medications, relative to non-expansion states. Our corresponding estimate for Rhode Island of a 12.2 percent increase, which does not, however, net out a counterfactual increase, appears broadly consistent with prior findings.

6. Discussion and Policy Implications

Critics of Medicaid expansion policies have argued that Medicaid insurance merely crowds out private insurance and therefore offers little value to its intended beneficiaries. This paper is unique in addressing this critique using individual-level panel data that enable direct observations of patients who moved across insurance payers following Rhode Island's implementation of the ACA and Medicaid expansion. We focus on the association of the Medicaid expansion with the number of patients receiving medications for opioid use disorder, given the ongoing urgency of this public health crisis and the prominent role that Medicaid has played historically in the treatment of substance use disorders.

Our analysis shows that following Rhode Island's implementation of the ACA and Medicaid expansion in January 2014, Medicaid payments for buprenorphine did substitute for or crowd out other forms of payment (mostly private insurance) to a nontrivial extent. Nonetheless, the crowding out reduces the estimated increase in buprenorphine patients associated with the ACA

(accounted for by Medicaid) by just 12 percent, such that we observe a robust and economically significant increase in patients receiving Medicaid-paid buprenorphine treatment in Rhode Island even when we control for payment switching and for the estimated increase in patients that would have occurred absent the ACA.

Wen et al. (2017) find that buprenorphine prescriptions (not individuals) financed by Medicaid increased 69 percent (in 2014 compared with 2011 to 2013) in the average Medicaid-expansion state relative to the average non-expansion state. Our corresponding estimate for Rhode Island entails a 28 percent net increase in buprenorphine patients. The fact that our estimate is lower may be because we discount patients who received buprenorphine before 2014 using private insurance and those suspected of using non-insurance subsidies, and because we count unique patients rather than buprenorphine prescriptions. That is, the estimate of Wen et al. may be inflated due to data limitations. However, our estimate might also differ because, among other possible reasons, it pertains to a single state only and considers a somewhat different time period.

In the case of methadone, crowding out of commercial insurance was negligible, while substitution for non-insurance subsidies with Medicaid appears to have been substantial. Again, however, we observe an economically significant net increase in methadone patients enabled by Medicaid following the ACA implementation. We estimate further that Rhode Island's ACA and Medicaid expansion enabled as many as 1,475 Rhode Island residents to initiate treatment (under Medicaid) with either methadone or buprenorphine in 2014 and 2015 alone, not including people who held health insurance prior to 2014. Data reflecting all payment sources in Rhode Island confirm that the aggregate number of patients receiving methadone in the state per quarter increased following the ACA implementation, and by a margin that well exceeded the growth that would have occurred if pre-ACA trends had simply persisted in 2014 and 2015.

In sum, (1) crowding out was nontrivial but incomplete for either buprenorphine or methadone, (2) the ACA in Rhode Island appears to have enabled many patients to access medications for OUD for the first time, and (3) Medicaid played an outsized role in the post-ACA increases in utilization of MOUD. All of these findings offer support for the expansion of Medicaid in states that have not already done so, based on the life-saving benefits of MOUD (Kravitz-Wirtz et al. 2020).

Although critics of Medicaid expansion have pointed to crowding out of private insurance as a drawback, patients who switch to Medicaid might experience benefits as well as costs. Most Medicaid plans, including Rhode Island's, offer free coverage of OUD medications and psychosocial therapy, whereas commercial plans often impose barriers to care such as copayments for office visits and prior authorization requirements for buprenorphine.

Furthermore, insurance that is tied to employment lacks the stability of Medicaid. On the other hand, some office-based buprenorphine providers are reluctant to accept Medicaid patients, as Medicaid plans typically offer lower reimbursement rates to providers compared with commercial plans (Polsky et al. 2017). For patients who received MOUD prior to Medicaid expansion using non-insurance subsidies, access to comprehensive health care under Medicaid should be preferred to provision of care for substance use disorders only, as prior research suggests that patient outcomes suffer (and costs are greater) under fragmented systems of treatment (Frandsen et al. 2015; Office of the Surgeon General 2016). Although it is beyond the scope of this paper to consider the costs of the program, previous research finds that the net cost of Medicaid expansion to states has typically fallen well below the direct costs of the health expenditures of expansion enrollees.

A limitation of our study is that we consider a single state and lack a control group. We attempt to control for what would have happened in Rhode Island absent the ACA using predicted increases based on pre-ACA trends. If the counterfactual trends for MOUD patients in Rhode Island would have been steeper than we predict, the actual increases in utilization net of the counterfactuals would be smaller, and possibly zero. This possibility applies to the growth rate of methadone treatment in particular, which exhibited some acceleration in 2013 (prior to the ACA implementation) relative to 2012, but nonetheless accelerated even further in 2014 relative to 2013. The acceleration in the growth rate of methadone treatment in 2013 over 2012 may reflect the implementation of the Medicaid health homes program mentioned above. However, if counterfactual trends would have been weaker than we predict, actual net increases in MOUD utilization would be even greater than we estimate. As mentioned above, the growth rate in buprenorphine prescriptions in the average non-expansion state—a presumed control group—did not accelerate in 2014 compared with 2012 and 2013, and if anything, it slowed modestly, a pattern that provides some justification for our estimates for Rhode Island.

References

- Alderks, Cathie E. 2017. "Trends in the Use of Methadone, Buprenorphine, and Extended-release Naltrexone at Substance Abuse Treatment Facilities: 2003—2015 (Update)." *The CBHSQ Report*, August 22, 2017. Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. Rockville, MD.
- American Psychiatric Association. 2013. *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Washington, DC.
- Antwi, Yaa Akosa, Asako S. Moriya, and Kosali 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.
<https://doi.org/10.1016/j.jhealeco.2014.11.007>
- Burke, Mary A. 2019. "Access to Medication-assisted Treatment for Opioid Use Disorder: Is Rhode Island Different, and Why?" Federal Reserve Bank of Boston Current Policy Perspectives No. 19-2.
- Burke, Mary A., and Riley Sullivan. 2020. "Medication-assisted Treatment for Opioid Use Disorder in Rhode Island: Who Gets Treatment, and Does Treatment Improve Health Outcomes?" Federal Reserve Bank of Boston. New England Public Policy Center Research Report 20-3.
- Burke, Mary A., Katherine Carman, Riley Sullivan, Hefei Wen, J. Frank Wharam, and Hao Yu. 2021. "Did the Affordable Care Act Affect Access to Medications for Opioid Use Disorder among the Already Insured? Evidence from the Rhode Island All-payer Claims Database." Federal Reserve Bank of Boston Research Department Working Papers No. 21-17. <https://doi.org/10.29412/res.wp.2021.17>
- Burns, Rachel M., Rosalie L. Pacula, Sebastian Bauhoff, Adam J. Gordon, Hollie Hendrikson, Douglas L. Leslie, and Bradley D. Stein. 2016. "Policies Related to Opioid Agonist Therapy for Opioid Use Disorders: The Evolution of State Policies from 2004 to 2013." *Substance Abuse* 37(1): 63–69. doi:10.1080/08897077.2015.1080208

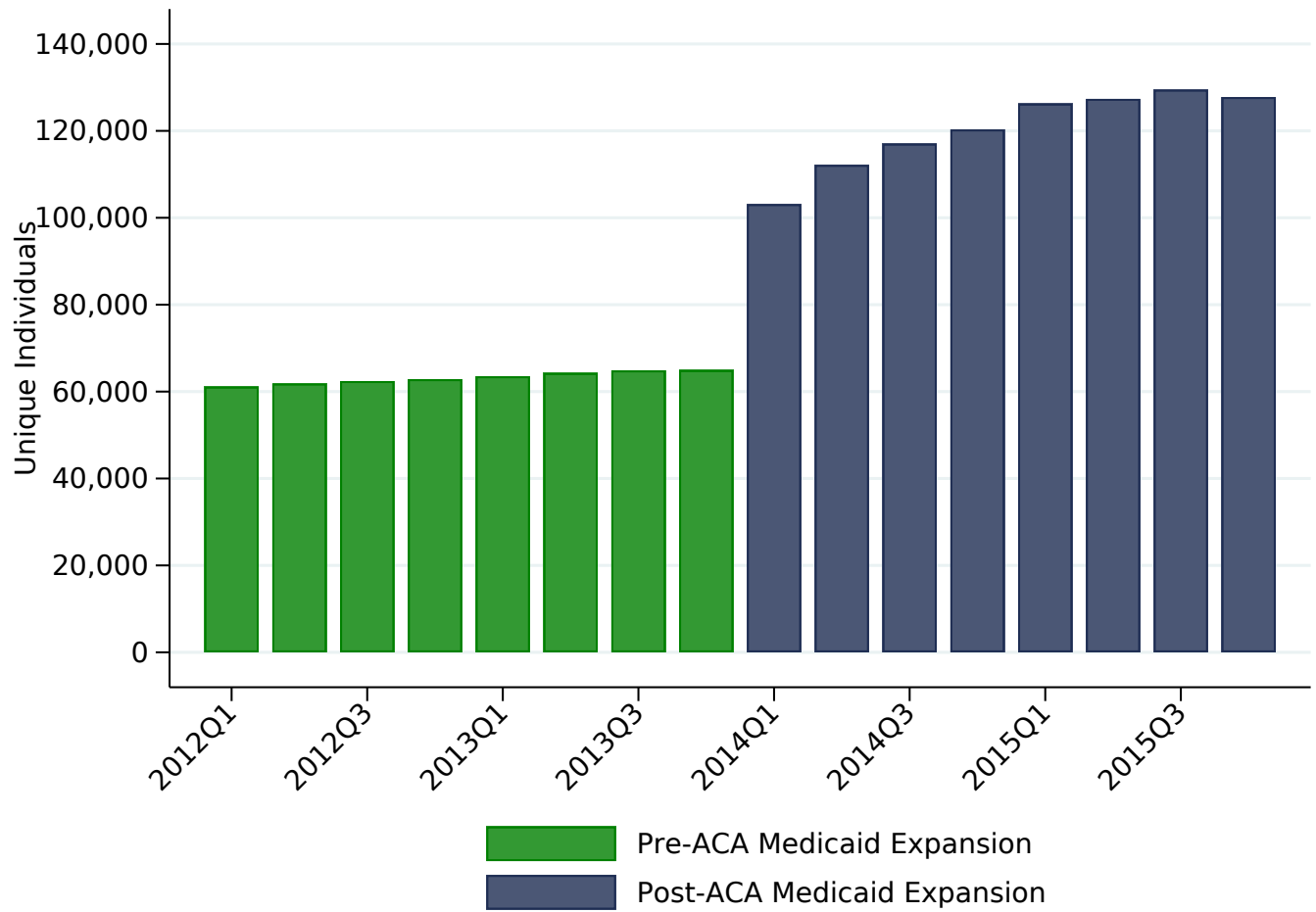
- Clemans-Cope, Lisa, Marni Epstein, M., and Genevieve M. Kenney, G.M. 2017. “Rapid Growth in Medicaid Spending on Medications to Treat Opioid Use Disorder and Overdose.” Washington, DC: Urban Institute.
- Clemans-Cope, Lisa, Jane B. Wishner, Eva H. Allen, Nicole Lallemand, Marni Epstein, and Brenda C. Spillman. 2017. “Experiences of Three States Implementing the Medicaid Health Home Model to Address Opioid Use Disorder—Case Studies in Maryland, Rhode Island, and Vermont.” *Journal of Substance Abuse Treatment* 83: 27–35.
<https://doi.org/10.1016/j.jsat.2017.10.001>
- Cole, Megan B., Omar Galárraga, Ira B. Wilson, Brad Wright, and Amal N. Trivedi. 2017. “At Federally Funded Health Centers, Medicaid Expansion Was Associated with Improved Quality of Care.” *Health Affairs*. 36(1): 40–48. <https://doi.org/10.1377/hlthaff.2016.0804>
- Connery, Hilary Smith. 2015. “Medication-Assisted Treatment of Opioid Use Disorder: Review of Evidence and Future Directions.” *Harvard Review of Psychiatry* 23(2): 63–75. Doi: 10.1097/HRP.0000000000000075
- Courtemanche, Charles, James Marton, Benjamin Ukert, Aaron Yelowitz, and Daniela Zapata. 2017. “Early Impacts of the Affordable Care Act on Health Insurance Coverage in Medicaid Expansion and Non-Expansion States.” *Journal of Policy Analysis and Management* 36(1): 178–210. doi: 10.1002/pam.21961
- Evans, Elizabeth A., Yuhui Zhu, Caroline Yoo, David Huang, and Yih-Ing Hser. 2019. “Criminal Justice Outcomes over 5 Years after Randomization to Buprenorphine-Naloxone or Methadone Treatment for Opioid Use Disorder.” *Addiction* 114: 1396–1404.
<https://doi.org/10.1111/add.14620>
- Florence, Curtis, Feijun Luo, and Ketra Rice. 2021. “The Economic Burden of Opioid Use Disorder and Fatal Opioid Overdose in the United States, 2017.” *Drug and Alcohol Dependence* 218: 108350. <https://doi.org/10.1016/j.drugalcdep.2020.108350>.
- Frandsen, Brigham R., Karen E. Joynt, James B. Rebitzer, and Ashish K. Jha. 2015. “Care Fragmentation, Quality, and Costs Among Chronically Ill Patients.” *The American Journal of Managed Care* 21(5): 355–362.

- Gibson, Amy, Louisa Degenhardt, Richard P. Mattick, Robert Ali, Jason White, and Susannah O'Brien. 2008. "Exposure to Opioid Maintenance Treatment Reduces Long-term Mortality." *Addiction* 103(3): 462–468. <https://doi.org/10.1111/j.1360-0443.2007.02090.x>
- Holahan, John, Shanna Rifkin, Kevin Lucia, and Katie Keith. 2012., "ACA Implementation—Monitoring and Tracking: Rhode Island." Washington, DC: Urban Institute.
- Kaiser Family Foundation. 2020. "Opioid Overdose Death Rates and All Drug Overdose Death Rates per 100,000 Population (Age-Adjusted)." Kaiser Family Foundation. February 13, 2020.
- Kravitz-Wirtz, Nicole, Corey S. Davis, William R. Ponicki, Ariadne Rivera-Aguirre, Brandon D. L. Marshall, Silvia S. Martins, and Magdalena Cerdá. 2020. "Association of Medicaid Expansion with Opioid Overdose Mortality in the United States." *JAMA Network Open* 3(1): e191066. doi:10.1001/jamanetworkopen.2019.19066
- Larochelle, Marc R., Dana Bernson, Thomas Land, Thomas J. Stopka, Na Wang, Ziming Xuan, Sarah M. Bagley, Jane M. Liebschutz, and Alexander Y. Walley. 2018. "Medication for Opioid Use Disorder after Nonfatal Opioid Overdose and Association with Mortality." *Annals of Internal Medicine* 169(3): 137–145. <https://doi.org/10.7326/M17-3107>
- Maclean, Johanna Catherine, and Brendan Saloner. 2019. "The Effect of Public Insurance Expansions on Substance Use Disorder Treatment: Evidence from the Affordable Care Act." *Journal of Policy Analysis and Management* 38(2): 366–393. <https://doi.org/10.1002/pam.22112>
- Mazurenko, Olena, Casey P. Balio, Rajender Agarwal, Aaron E. Carroll, and Nir Menachemi. 2018. "The Effects of Medicaid Expansion under The ACA: A Systematic Review." *Health Affairs* 37(6): 944–950. Doi: 10.1377/hlthaff.2017.1491
- Meinhofer, Angélica, and Allison E. Witman, 2018. "The Role of Health Insurance on Treatment for Opioid Use Disorders: Evidence from the Affordable Care Act Medicaid Expansion." *Journal of Health Economics* 60: 177–197. <https://doi.org/10.1016/j.jhealeco.2018.06.004>

- Miller, Sarah, and Laura R. Wherry. 2017. "Health and Access to Care during the First 2 Years of the ACA Medicaid Expansions." *New England Journal of Medicine* 376(10): 947–956.
- Office of the Surgeon General. 2016. "Facing Addiction in America: The Surgeon General's Report on Alcohol, Drugs, and Health." U.S. Department of Health and Human Services (HHS). Washington, DC.
<https://addiction.surgeongeneral.gov/sites/default/files/surgeon-generals-report.pdf>.
- Polsky, Daniel, Molly Candon, Brendan Saloner, Douglas Wissoker, Katherine Hempstead, Genevieve M. Kenney, and Karin Rhodes. 2017. "Changes in Primary Care Access Between 2012 and 2016 for New Patients with Medicaid and Private Coverage." *JAMA Internal Medicine* 177(4): 588–590. doi:10.1001/jamainternmed.2016.9662
- Rhode Island Executive Office of Health and Human Services. 2012. "Report to the Centers for Medicare and Medicaid Services." Quarterly Operation Report, Rhode Island Global Consumer Choice Compact, 1115 Waiver Demonstration.
- Saloner, Brendan, and Shankar Karthikeyan. 2015. "Changes in Substance Abuse Treatment Use among Individuals with Opioid Use Disorders in the United States, 2004–2013." *Journal of the American Medical Association* 314(14): 1515–1517. Doi: 10.1001/jama.2015.10345
- Sammon, Jesse D., Emily C. Serrell, Patrick Karabon, Jeffrey J. Leow, Firas Abdollah, Joel S. Weissman, Paul Han, Moritz Hansen, Mani Menon, and Quoc-Dien Trinh. 2018. "Prostate Cancer Screening in Early Medicaid Expansion States." *The Journal of Urology*, 199(1): 81–88. <https://doi.org/10.1016/j.juro.2017.07.083>
- Simon, Kosali, Aparna Soni, and John Cawley. 2017. "The Impact of Health Insurance on Preventive Care and Health Behaviors: Evidence from the First Two Years of the ACA Medicaid Expansions." *Journal of Policy Analysis and Management* 36(2): 390–417. <https://doi.org/10.1002/pam.21972>
- Sommers, Benjamin D., Robert J. Blendon, E. John Orav, and Arnold M. Epstein. 2016. "Changes in Utilization and Health Among Low-Income Adults after Medicaid

- Expansion or Expanded Private Insurance.” *JAMA Internal Medicine* 176(10): 1501–1509. <https://doi.org/10.1001/jamainternmed.2016.4419>
- Substance Abuse and Mental Health Services Administration. 2018. *Medicaid Coverage of Medication-Assisted Treatment for Alcohol and Opioid Use Disorders and of Medication for the Reversal of Opioid Overdose*. HHS Publication No. SMA-18-5093. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2018.
- Volkow, Nora D., Thomas R. Frieden, Pamela S. Hyde, and Stephen S. Cha. 2014. “Medication-Assisted Therapies—Tackling the Opioid-Overdose Epidemic.” *New England Journal of Medicine* 370(22): 2063–2066. Doi: 10.1056/NEJMp1402780
- Wall, Ronald, Jurgem Rehm, Benedickt Fischer, Bruno Brands, Louis Gliksman, Jennifer Stewart, Wendy Medved, and Joan Blake. 2000. “Social Costs of Untreated Opioid Dependence.” *Journal of Urban Health: Bulletin of the New York Academy of Medicine*. 77(4): 688–722. <https://doi.org/10.1007/BF02344032>
- Wen, Hefei, Janet R. Cummings, Jason M. Hockenberry, Laura M. Gaydos, and Benjamin 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, Hefei, Jason M. Hockenberry, Tyrone Borders, and Benjamin Druss. 2017. “Impact of Medicaid Expansion on Medicaid-covered Utilization of Buprenorphine for Opioid Use Disorder Treatment.” *Medical Care* 55(4): 336–341.

Figure 1: Rhode Island Medicaid Enrollees
Basic Sample



Source: Authors' calculations using HealthFacts RI.

Notes: Total number of Medicaid enrollees in a given quarter includes those aged 18 and older who were living in Rhode Island and enrolled in RI Medicaid in any month in the quarter. The sample excludes all individuals who ever received subsidized health-care services under the aid category "Costs Not Otherwise Matchable" or "CNOM."

Table 1: Guide to Labels in Figures 2–4 and Tables 2–4

Label	Definition
Medicaid Buprenorphine/ Methadone/MOUD Recipients (Adjustment 0)	Individuals who received buprenorphine/methadone/MOUD as treatment for OUD and used Medicaid to pay for that treatment at least once in a given quarter
Adjustment 1	Excludes individuals in 2014Q1 and later who received buprenorphine/methadone/MOUD in the given quarter using Medicaid as payment, but who prior to 2014 had received buprenorphine/methadone/MOUD and exclusively paid for it with non-Medicaid insurance
Adjustment 2	Further excludes those who first appear in the sample (with any insurance) in January 2014 or later and who received buprenorphine/methadone/MOUD paid for by Medicaid in their first month of enrollment
Adjustment 3	Further excludes FFS to MCO switchers; that is to say, individuals who were enrolled exclusively in Rhode Island's Medicaid fee-for-service plan pre-2014 and who were enrolled in a Medicaid managed care plan in a majority of months from 2014–2015
Predicted Number of MOUD Recipients	Predicted number of buprenorphine/methadone/MOUD recipients in 2014Q1–2015Q4 based on a linear model fitted to the actual 2012Q1–2013Q4 buprenorphine/methadone/MOUD levels

Figure 2: Rhode Island Medicaid Buprenorphine Recipients, Adjusted and Unadjusted Estimates and Counterfactual Basic Sample

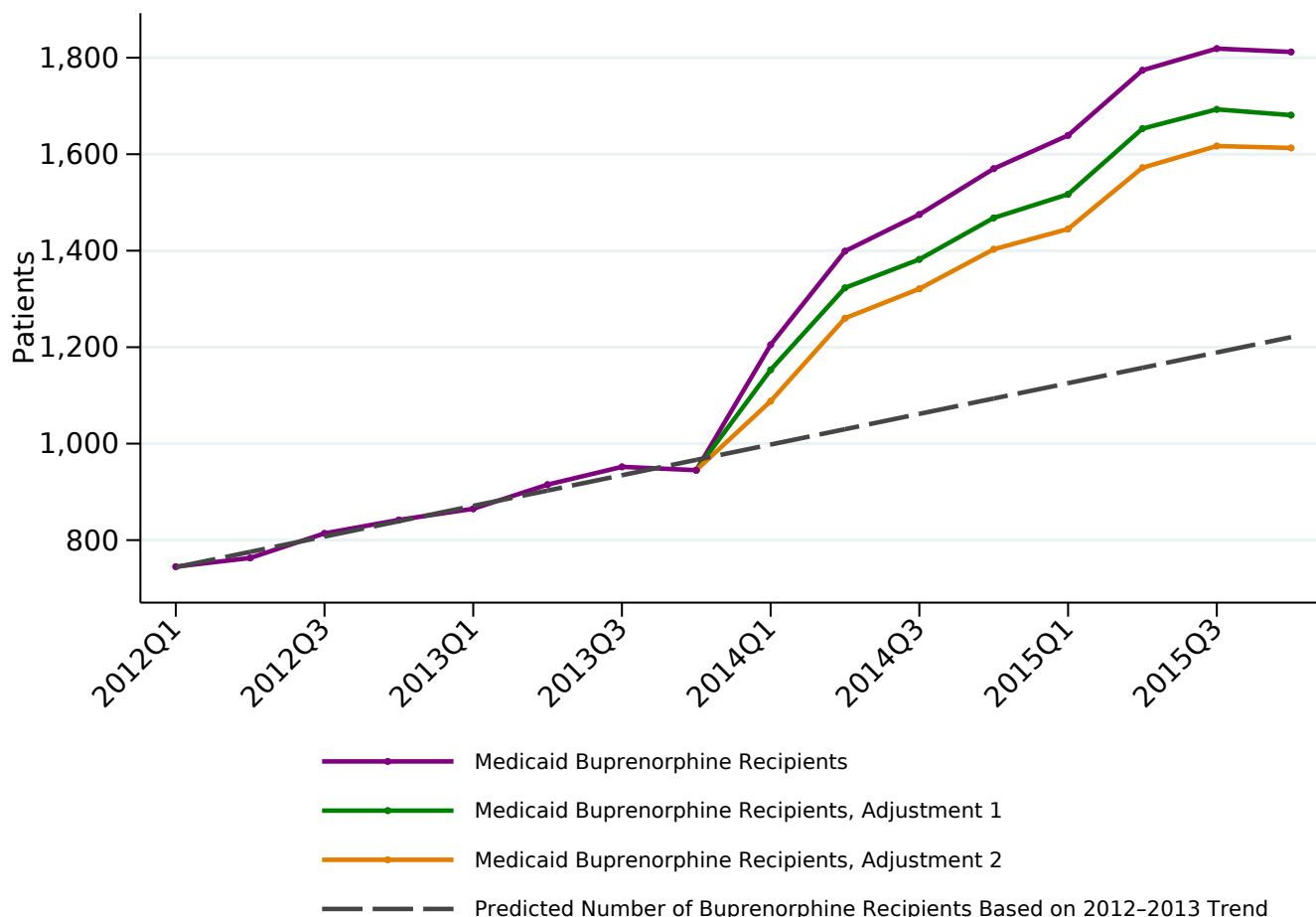


Table 2: Average Number of Rhode Island Medicaid Buprenorphine Recipients per 1,000 Residents Levels and Percentage Changes from 2012Q1–2013Q4 to 2014Q1–2015Q4, Basic Sample

	Average Level per 1,000 Residents		Percentage Change	Percentage Change
	2012Q1–2013Q4	2014Q1–2015Q4	in Average Levels	Relative to Counterfactual
Medicaid Buprenorphine Recipients	.81	1.5	85.3	43
Medicaid Buprenorphine Recipients, Adjustment 1	.81	1.4	73.3	33.7
Medicaid Buprenorphine Recipients, Adjustment 2	.81	1.34	65.2	27.5

Source: Authors' calculations using HealthFacts RI, Bureau of Economic Analysis/Haver Analytics.

Notes: The basic sample includes all individuals aged 18 and older who were residing in Rhode Island and had at least six consecutive observations in the RI APCD (with any insurance type) from April 2011 through May 2019. The sample excludes all individuals who ever received subsidized health-care services under the aid category "Costs Not Otherwise Matchable" or "CNOM." "Medicaid buprenorphine recipients" consists of those individuals who paid for buprenorphine using Medicaid at least once in a given month. In calculating the "percentage change relative to counterfactual" in the fourth column, the counterfactual refers to the predicted level of buprenorphine recipients in 2014Q1–2015Q4 based on a linear model fitted to the actual 2012Q1–2013Q4 buprenorphine levels.

Figure 3: Rhode Island Medicaid Methadone Recipients, Adjusted and Unadjusted Estimates and Counterfactual Basic Sample



Table 3: Average Number of Rhode Island Medicaid Methadone Recipients per 1,000 Residents Levels and Percentage Changes from 2012Q1–2013Q4 to 2014Q1–2015Q3, Basic Sample

	Average Level per 1,000 Residents		Percentage Change	Percentage Change
	2012Q1–2013Q4	2014Q1–2015Q3	in Average Levels	Relative to Counterfactual
Medicaid Methadone Recipients	1.13	2.24	97.3	63.3
Medicaid Methadone Recipients, Adjustment 2	1.13	1.87	64.9	36.4
Medicaid Methadone Recipients, Adjustment 3	1.12	1.82	62.3	32.9

Source: Authors' calculations using HealthFacts RI, Bureau of Economic Analysis/Haver Analytics.

Notes: The basic sample includes all individuals aged 18 and older who were residing in Rhode Island and had at least six consecutive observations in the RI APCD (with any insurance type) from April 2011 through May 2019. The sample excludes all individuals who ever received subsidized health-care services under the aid category "Costs Not Otherwise Matchable" or "CNOM." In calculating the "percentage change relative to counterfactual" in the fourth column, the counterfactual refers to the predicted level of methadone recipients in 2014Q1–2015Q3 based on a linear model fitted to the actual 2012Q1–2013Q4 methadone levels.

Figure 4: Rhode Island Medicaid MOUD Recipients, Adjusted and Unadjusted Estimates and Counterfactual Basic Sample

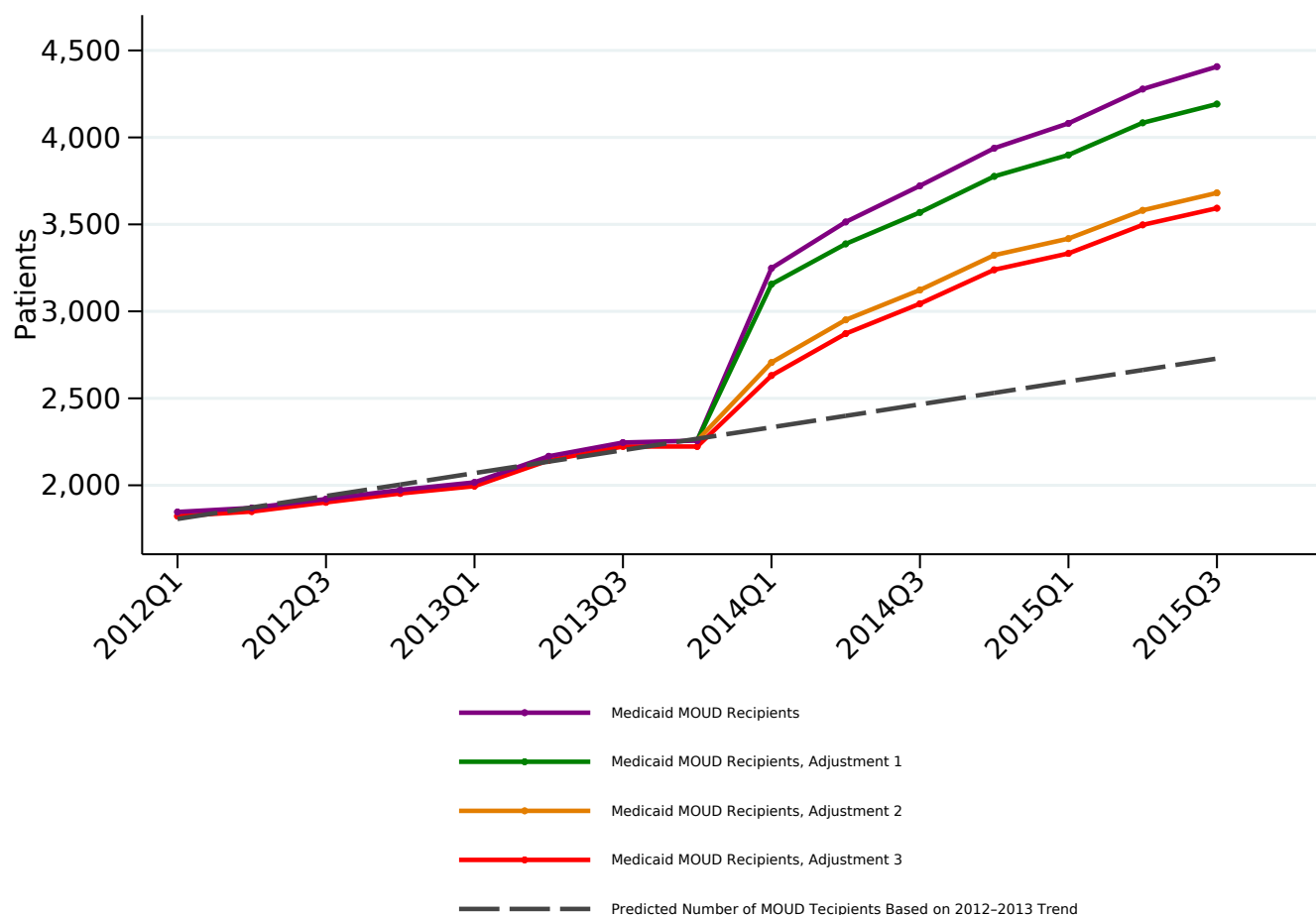


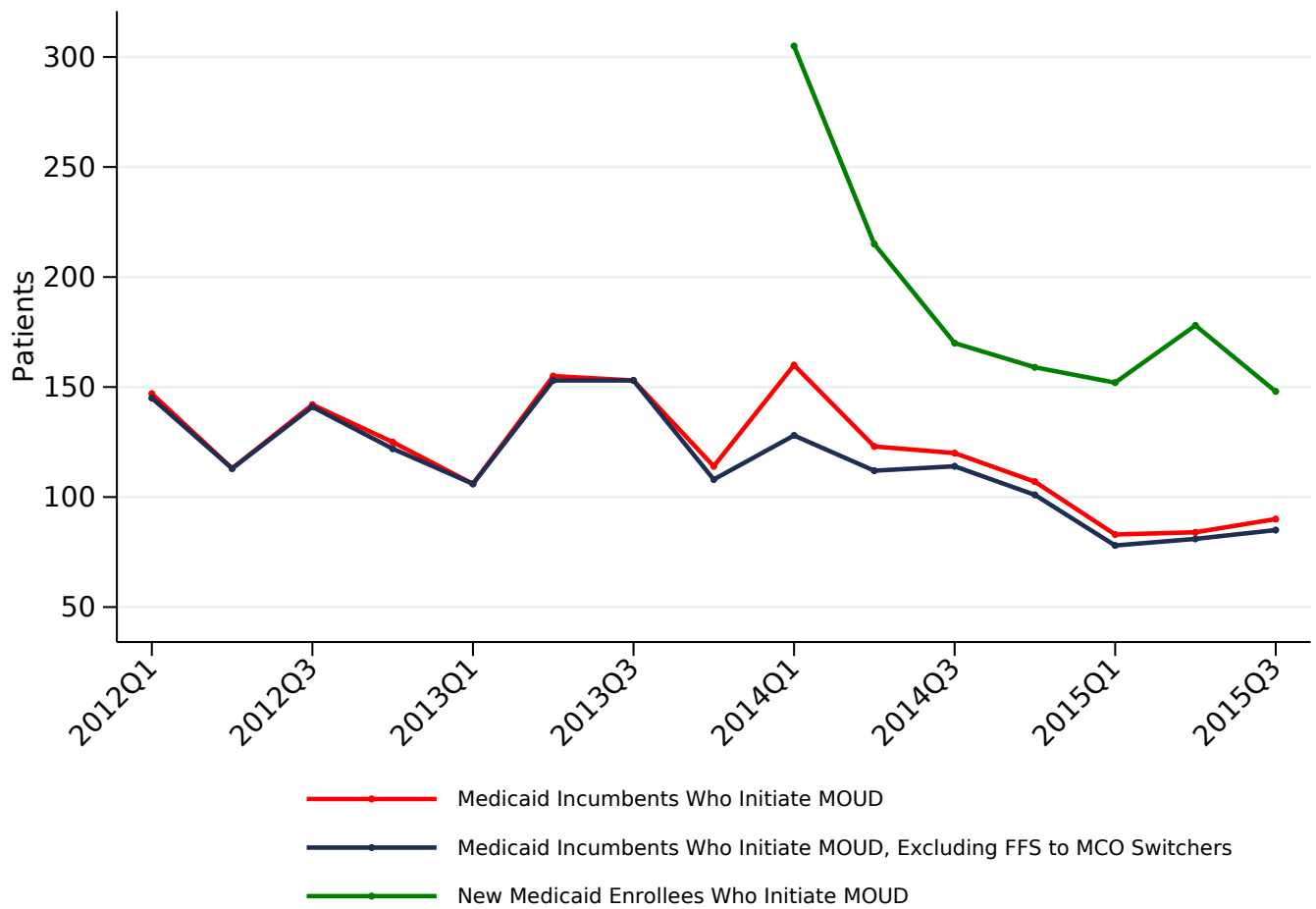
Table 4: Average Number of Rhode Island Medicaid MOUD Recipients per 1,000 Residents Levels and Percentage Changes from 2012Q1–2013Q4 to 2014Q1–2015Q3, Basic Sample

	Average Level per 1,000 Residents		Percentage Change	Percentage Change
	2012Q1–2013Q4	2014Q1–2015Q3	in Average Levels	Relative to Counterfactual
Medicaid MOUD Recipients	1.93	3.68	90.4	53.4
Medicaid MOUD Recipients, Adjustment 1	1.93	3.52	82.6	47.1
Medicaid MOUD Recipients, Adjustment 2	1.93	3.08	59.6	28.6
Medicaid MOUD Recipients, Adjustment 3	1.91	3	57.4	27

Source: Authors' calculations using HealthFacts RI, Bureau of Economic Analysis/Haver Analytis.

Notes: The basic sample includes all individuals aged 18 and older who were residing in Rhode Island and had at least six consecutive observations in the RI APCD (with any insurance type) from April 2011 through May 2019. The sample excludes all individuals who ever received subsidized health-care services under the aid category "Costs Not Otherwise Matchable" or "CNOM." In calculating the "percentage change relative to counterfactual" in the fourth column, the counterfactual refers to the predicted level of MOUD (methadone or buprenorphine) recipients in 2014Q1–2015Q3 based on a linear model fitted to the actual 2012Q1–2013Q4 MOUD levels.

Figure 5: Rhode Island Medicaid MOUD Initiations by Medicaid Entry Date
Basic Sample



Source: Authors' calculations using HealthFacts RI.

Notes: The basic sample includes all individuals aged 18 and older who were residing in Rhode Island and had at least six consecutive observations in the RI APCD (with any insurance type) from April 2011 through May 2019. The sample excludes all individuals who ever received subsidized health-care services under the aid category "Costs Not Otherwise Matchable" or "CNOM." Medicaid incumbents are those who are first observed as a Medicaid enrollee before January 2014. New Medicaid enrollees are those first observed with Medicaid in January 2014 or later. Initiating MOUD in a quarter means it is the first quarter in which the patient received either buprenorphine or methadone, using any form of payment observed in the data. However, the series count only initiations in which the patient paid for treatment using Medicaid, and patients who receive MOUD in their first month observed are omitted entirely.

Figure 6: All Rhode Island Methadone Patients

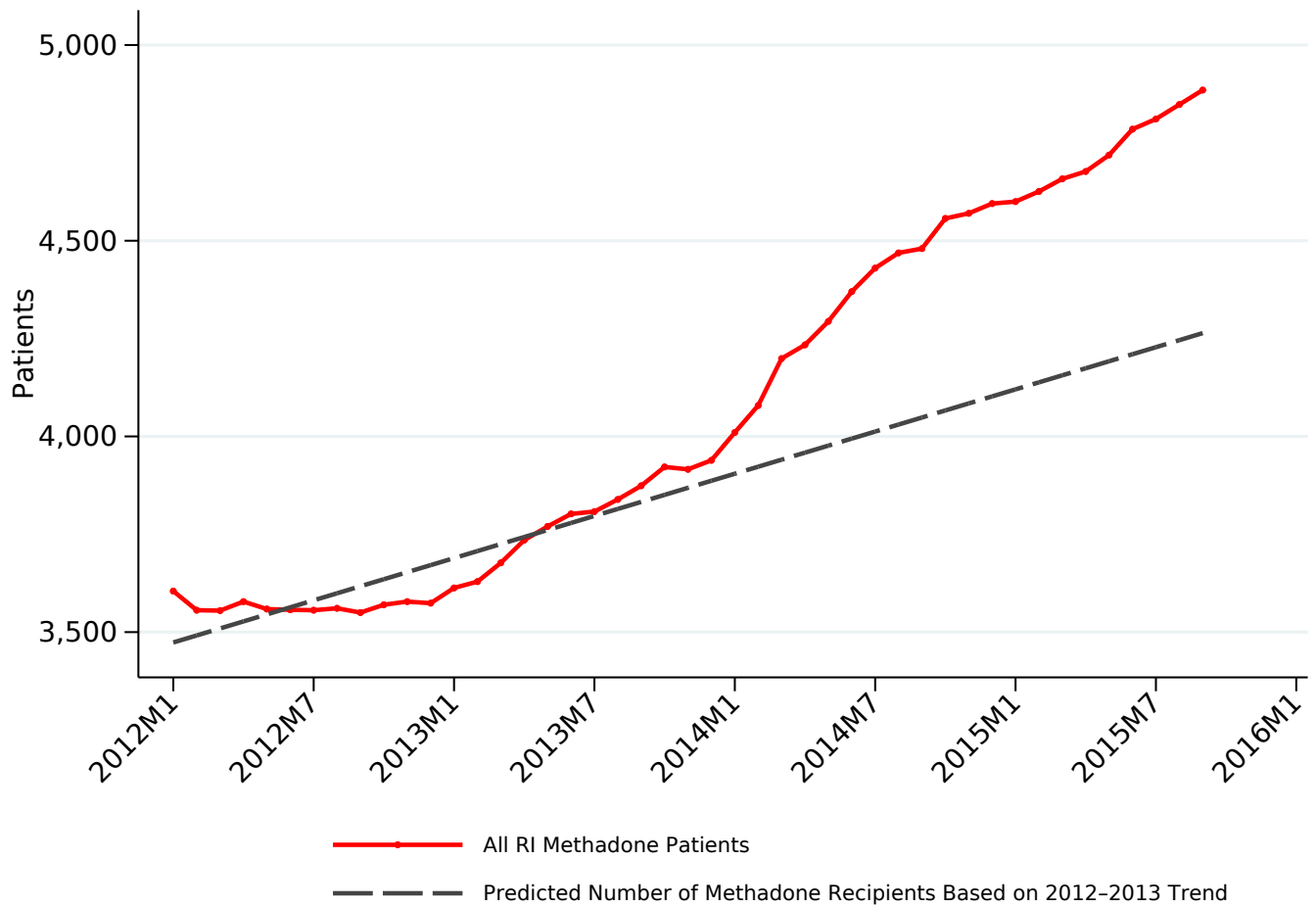


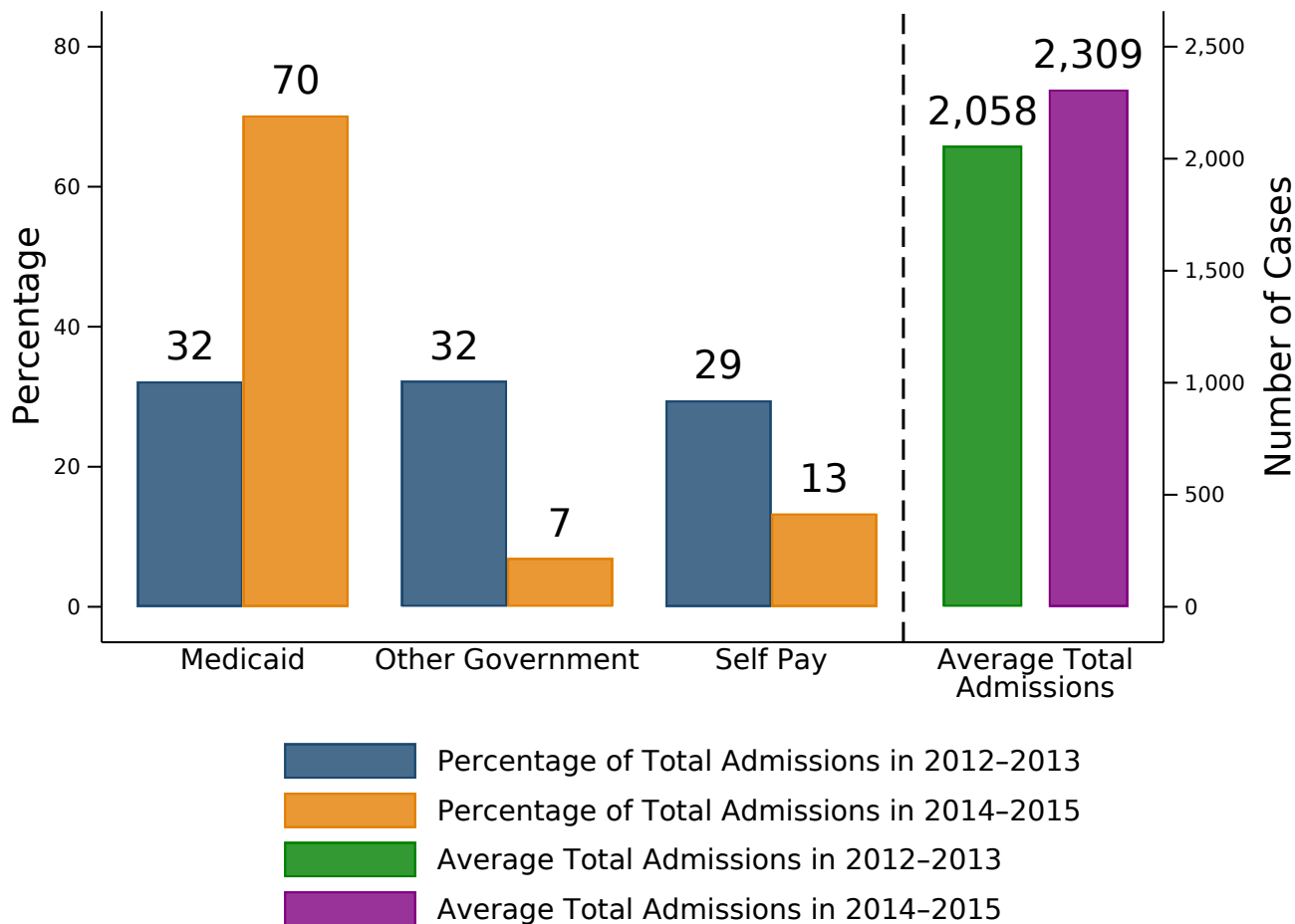
Table 5: Average Number of Rhode Island Methadone Recipients as Reported by BHDDH Levels and Percentage Changes from 2012Q1–2013Q4 to 2014Q1–2015Q3

	Average Level		Raw Change in Average Levels	Percentage Change in Average Levels	Percentage Change Relative to Counterfactual
	2012Q1–2013Q4	2014Q1–2015Q3			
All RI Methadone Patients	3,680	4,519	838.7	22.8	11
All RI Methadone Patients per 1,000 Residents	3.5	4.3	0.8	22.6	11
APCD Medicaid Methadone Recipients, Adjustment 3	1,185	1,926	741	62.5	32.9

Source: Authors' calculations using RI Behavioral Health On-line Data (RI-BHOLD) and HealthFacts RI.

Notes: "All RI methadone patients" refers to the number of methadone treatment recipients as reported by the Rhode Island Department of Behavioral Healthcare, Developmental Disabilities and Hospitals (BHDDH). In calculating the "percentage change relative to counterfactual" in the fifth column, the counterfactual refers to the predicted level of methadone recipients in 2014Q1–2015Q4 based on a linear model fitted to the actual 2012Q1–2013Q4 methadone levels.

Figure 7: Composition of Payment Types among Rhode Island Treatment Episodes for OUD Including Medication, 2012–2013 and 2014–2015



Source: Authors’ calculations using Treatment Episode Data Set: Admissions (TEDS-A), restricted to Rhode Island and years 2012, 2013, 2014, and 2015.

Notes: An “admission” refers to an admission to a specialty opioid treatment program in Rhode Island such that the treatment was to include some form of medication for OUD. The specific medication/s used are not recorded in the data, but other evidence shows that methadone would have been by far the most common choice, followed by buprenorphine and naltrexone (Alderks 2017). For a given payment type and two-year time period, “Percentage of Total Admissions” represents the average of the two underlying single-year values of the percentage of total admissions with that payer type. “Average Total Admissions” for a given two-year time period represents the average of the two underlying single-year values of total admissions. Percentages do not add to 100 because several payer types (private insurance, Medicare, no charge, other, missing) are omitted. Each of these latter payment types accounted for 5 percent or less of the MOUD admissions in each period.