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THE RISE AND FALL (AND RISE) OF THE AFFORDABLE CARE ACT: VARYING IMPACTS ON COVERAGE OVER TIME AND PLACE

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The Rise and Fall (and Rise) of the Affordable Care Act: Varying Impacts on Coverage Over Time and Place

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ABSTRACT

The Affordable Care Act (ACA) significantly expanded health insurance in the United States, but its impact has varied across time and states. We assess the law's heterogeneous impacts over the three presidential administrations since its enactment, as well as across states with different levels of implementation of the law. We focus on Medicaid expansion and Marketplace subsidies, including the enhanced subsidies under the American Rescue Plan of 2021 (ARP). We use national household survey data and a triple-difference design – leveraging variation by time, state, and income – to identify the coverage impacts of the key components of the law. We find that 55% of ACA-related coverage gains between 2013 and 2023 came from Marketplace subsidies – about 37% from the original ACA subsidies and 19% from the ARP enhancements – while 45% were due to Medicaid, including from the "welcome mat" effect. Coverage gains differed substantially across presidential administrations, with Marketplace subsidies proving roughly 30% more effective under Presidents Obama and Biden than under President Trump. The same subsidy amount was more than twice as effective in states with their own Marketplaces than in states relying on the federal Marketplace. Our findings highlight that while the ACA's explicit economic features drive coverage gains, their effectiveness can be substantially enhanced or hindered through federal and state implementation.

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1. INTRODUCTION

The Affordable Care Act (ACA) represents the most significant expansion of health insurance coverage in the United States over the past 60 years. Current estimates suggest that there are more than 20 million fewer people with health insurance in the U.S. than there would have been without the law, with the uninsured rate hitting an all-time low in the U.S. in 2023 (Glied and Sommers 2024). A large literature has documented the positive impacts of the law on health insurance coverage, financial security, health care access, and health outcomes (Gruber and Sommers 2019; Guth and Ammula 2021).

At the same time, the ACA has been through significant ups and downs of political support and popularity, with variation in implementation and oversight both over time and across states (Oberlander 2020). The law never had more than 50 percent public support until 2017 (KFF 2024), when it came within one vote in the Senate of being repealed. Though not repealed, the law was significantly weakened during the Trump Administration, through actions including reduced funding for outreach among individuals with subsidized coverage, shortened enrollment periods, introduction of less generous short-term insurance plans, and a steady drumbeat of criticism from administration officials (Goodnough and Pear 2017; Scott 2018). The number of uninsured nonelderly individuals in the U.S. rose from 28.9 to 31.2 million over the 2017-2020 period (NHIS 2024).

But the arrival of the COVID-19 pandemic, along with the subsequent election of President Biden, led to a series of actions that strengthened the law in many ways, including some that went beyond its original formulation. Most conspicuously, this included a large increase in the generosity of the tax credits available to individuals (as well as who was eligible for them) on the ACA Marketplaces through the American Rescue Plan Act (ARP) in 2021, which were then extended through 2025 under the Inflation Reduction Act (IRA) (Cox, Amin, and Ortaliza 2022) (for simplicity, we refer to these as the "ARP subsidies" hereafter). The Biden Administration also embraced the law by extending enrollment periods, boosting outreach, and touting its success (CEA 2025). Over the 2021-2023 period, the share of

the nonelderly population without health insurance fell from 10.3 to 8.9 percent, representing the lowest uninsured rate on record (NHIS 2024).

Throughout the entire implementation period, there has also been significant variation in state approaches to the ACA (Oberlander 2016). The choice of whether to expand Medicaid under the law – made possible by a Supreme Court ruling in 2012 rendering it a state option – has received the most attention in the research literature, with numerous studies showing large gains in insurance in expansion states compared to non-expansion states (Buchmueller et al. 2016; Miller and Wherry 2017; Courtemanche et al. 2019; Guth and Ammula 2021). But states also have the choice of whether to create their own state-based Marketplaces (SBMs) or defer to the federally-facilitated Marketplace (FFM) on *HealthCare.gov*. Linked to this choice is variation in other state approaches including outreach efforts, enrollment assistance policies, the length of open enrollment periods, and the introduction of state-level insurance mandates after Congress effectively eliminated the federal mandate starting in 2019.[2]

In this paper, we investigate the heterogeneous impacts of the ACA over time and across states, assessing quantitatively the key contributors to changes in insurance coverage over the 2013 to 2023 period. We build on earlier work (Frean, Gruber, and Sommers 2017), which illustrated the contribution of the various components of the ACA to its early successes, by considering how these components have evolved over the first decade of ACA implementation and under different state and federal implementation approaches. To identify the coverage impacts of the law, we use rich national survey data, combined with variation in Medicaid eligibility and Marketplace subsidies between and within states over time, by income and area health insurance premiums.

Overall, we find that approximately 55 percent of the coverage gains from the ACA between 2013 and 2023 were attributable to Marketplace subsidies. By 2023, 19 percent of the overall ACA gains

[2] Congress did not technically repeal the mandate but instead zeroed out the provision's tax penalty.

were a result of the extended and enhanced subsidies from the ARP, while 37 percent were from the original ACA Marketplace subsidies. Forty-five percent of the ACA-related coverage gains were attributable to greater Medicaid coverage – 30 percent as a result of new eligibility ushered in by the ACA, with the remaining 15 percent from the "welcome mat effect" of greater enrollment among previously-eligible populations. Compared to prior research using 2014-2015 data (Frean, Gruber, and Sommers 2017), these findings reflect a larger role for Marketplace coverage and Medicaid expansion as the ACA has matured, and a smaller role for the welcome mat as a share of total enrollment gains.

We find significant differences in the ACA's reach across presidential administrations, particularly when it comes to the effectiveness of Marketplace subsidies in reducing uninsurance. We find that the same subsidy amount went further in reducing uninsurance under the Obama and Biden Administrations than under the Trump Administration. We also find that the same subsidy amount was far more effective in boosting coverage in states with SBMs than in states using the federal platform, and this pattern held true across all three administrations. This state-based pattern was also evident in the reach of the ARP subsidies. We also detect positive coverage effects of state-based mandates since the repeal of the federal mandate, which we conclude may serve as a proxy for broader state-based efforts to bolster coverage.

In essence, our results show that the explicit economic features of the ACA – eligibility levels and subsidy amounts – have large effects on coverage, as expected, but these effects are mediated through important differences in implementation. The same subsidy amount produced over a 30 percent larger reduction in uninsurance under President Biden than under President Trump, and a full doubling of the effect in SBM vs. FFM states (a magnitude that was similar under all three presidential administrations we examined). This points to potentially large informational and administrative barriers for those potentially eligible for Medicaid and Marketplace coverage, which active outreach, modified

enrollment periods, and other forms of investment can help overcome in order to get more people enrolled in health insurance.

We find that implementation and increased financial support work in tandem to expand coverage. For instance, when analyzing coverage related to Marketplace subsidies in 2023, we find that nearly 20 percent of the coverage gains relative to 2019 were attributable to the broader pro-ACA environment that boosted the effective take-up of subsidies already in place before the ARP, while the new ARP subsidies themselves accounted for roughly 80 percent of the changes since 2019.

Put simply, implementation matters. While our findings show that the ACA has proven to be a remarkably resilient law, with durable coverage gains even under leadership hostile to its goals, the benefits of the law vary – pointing to the importance of not just the letter of the law but the spirit of its implementation to fully understand its effects.

The rest of our paper is organized as follows. Section 2 provides an overview of the ACA and its varied implementation across states, presidential administrations, and time. This section also examines the existing literature on the law and outlines the contributions of our work. Section 3 details our data sources, policy measure construction, and empirical approach. Section 4 describes our results, which includes examining the overall ACA coverage effects between 2013 and 2023 and the differential policy effects under the three presidential administrations. We then decompose the overall uninsured effect, examine the policy effects by coverage type and assess crowd out, and evaluate the heterogeneity of the effect of each policy variable across state groups and time. Section 5 concludes.

2. BACKGROUND: THE ACA AND ITS VARIED IMPLEMENTATION

The ACA has been politicized at both the federal and state levels since its inception. Despite the law's origins in Republican-led health reform efforts (primarily the 2006 Massachusetts health reform law signed by Republican governor Mitt Romney) it was passed without a single Republican vote in Congress in 2010. Republican opposition since the law's passage is perhaps most conspicuous in the overt

attempts to overturn the law – both through several Republican state-led Supreme Court cases to dismantle its key components and Senate Republicans' failed attempt to repeal the law in 2017. While some Republicans have emerged since the ACA's passage as supporters of state Medicaid expansions or/and opponents of sweeping repeal efforts, conservative policymakers have continued to criticize the law and have used a variety of administrative tools to limit its reach, particularly during the Trump Administration.

2.1 A Brief Overview of the ACA and its Politics

The ACA is an ambitious law that had sweeping implications for the entire health care system, including by increasing access to affordable health insurance, implementing a national coverage mandate, dramatically reforming individual health insurance market through federal regulations, and implementing payment and delivery system reforms. Our analysis focuses primarily the impact of the law's main coverage affordability provisions. We also briefly examine the effects of the coverage mandate.

The ACA included two main provisions to increase access to affordable health insurance. First, it expanded Medicaid – the public health insurance programs for those with low incomes – to adults without disabilities or dependent children (sometimes referred to as "childless adults," though many have non-dependent children). Prior to the ACA, eligibility for Medicaid was generally limited to only low-income adults who met certain income *and* categorical eligibility requirements (such as being pregnant, having a dependent child, or having a disability), with wide variation in eligibility thresholds across states. In its original form – prior to the Supreme Court ruling making expansion a state option – the ACA was intended to expand Medicaid to any adult with family income at or below 138 percent of the FPL, regardless of whether they met the former categorical eligibility requirements.[3]

[3] Immigration-related restrictions to Medicaid eligibility still applied, with only citizens or qualified legal immigrants (including those with permanent residency status for at least 5 years) able to enroll in full benefits.

Second, it established the availability of subsidies for Marketplace coverage (which were made available through the law's overhaul of the individual market), primarily in the form of advanced (and refundable) premium tax credits for individuals and households making between 100-400 percent of the FPL. These credits imposed income-related payments towards premiums, with individuals at the bottom of the scale paying between roughly two to nine percent of their income, and those at 300 percent of the FPL or higher paying closer to 10 percent of their income. The ACA also included an individual mandate penalty, which required most individuals to have health insurance unless they met certain exemption requirements, or they would face a fine. Upon enactment, these three provisions – and the broader law – have been opposed and often undermined by Republicans at both the federal and state levels (Patashnik and Oberlander 2018), as explored in the next two sections.

2.2 State Implementation Choices and the ACA

The most obvious battlefront has been the state-level debate over Medicaid expansion. In the aftermath of the Supreme Court decision that handed the choice of whether to expand Medicaid over to the states, the result has been an uneven policy patchwork. Many states with Republican-led legislatures and governors' offices have repeatedly refused to expand Medicaid despite significant funding incentives from the federal government (Coleman 2021). Some Republican-led states have expanded Medicaid, though several that have expanded since 2014 have done so via voter-led ballot initiatives (Brantley and Rosenbaum 2021). Partisan power among state leadership – as well as the overall political ideology of a state – are among the strongest predictors of whether states have chosen to expand their programs (Barrilleaux and Rainey 2014; Lanford and Quadagno 2016; Rocco, Keller, and Kelly 2020).

Unlike the decision to expand Medicaid, states have no direct control over the availability of subsidized Marketplace coverage, which apply in all states. States do, however, have significant discretion over how this national policy is implemented through several state-level levers (Trachtman

2020). Most notably, states are able to decide whether to run their own SBM or to use the federal platform and have individuals sign up for coverage through *HealthCare.gov* (a choice that also delegates subsidy eligibility determination to the federal government). Upon the ACA's enactment, *HealthCare.gov* was envisioned as a fallback option, and most states were expected to embrace the opportunity to create their own Marketplaces (Jones, Bradley, and Oberlander 2014). Moreover, the Marketplaces were one of the more market-oriented parts of the law, embodying ideas of choice and competition that Republicans frequently champion and were expected to evade the political fight other provisions of the law faced in their implementation (Rigby and Haselswerdt 2013). However, only 17 states and the District of Columbia initially opted to create their own Marketplace (Dash et al. 2013), the overwhelming majority of them being under Democratic leadership. Not investing in SBMs – and relegating responsibility for Marketplace coverage to the federal government – was another pathway through which conservatives initially resisted the law (Jones, Bradley, and Oberlander 2014). Today, 19 states and the District of Columbia operate their own Marketplace (KFF 2025).

SBMs generally invest in more advertising, outreach, and other strategies to increase enrollment in coverage – like funding navigators – beyond federally-facilitated efforts in states with FFMs. These state-specific strategies are in theory more insulated from choices regarding the implementation of the federal platform and thus the changes that come with new presidential administrations. State and federal choices surrounding Marketplace implementation, outreach, and enrollment assistance have been shown to differentially shape levels of awareness and take-up of subsidized coverage across states (Sommers et al. 2015; Gollust et al. 2018). The varied approaches to the Marketplaces – and state-level resistance to their implementation – has led to variation in the amount of success seen in the Marketplaces across states (Jones, Gordon, and Huberfeld 2020), typically with state-specific strategies bolstering enrollment compared to states that rely on the federal platform (Zhu, Polsky, and Zhang 2018; Schwab, Swindle, and Giovannelli 2022).

The individual mandate could have also been anticipated to garner support from Republicans, as it was initially a conservative think-tank proposal from the 1990s, and then a key part of then-governor Mitt Romney's support of the policy in Massachusetts health reform (Roy 2011; Oberlander 2011). However, the mandate became one of the most politicized parts of the law and was ultimately zeroed out in the Republican-led Tax Cuts and Jobs Act of 2017 (Oberlander 2011; Kaplan and Tankersley 2017). Since its effective repeal, three Democratically-led states (California, New Jersey, and Rhode Island) and the District of Columbia have implemented enforceable state-level insurance mandates, joining Massachusetts, which maintained its pre-existing mandate. Vermont enacted a mandate but without any penalty, just like the federal mandate (McDonough 2021).

2.3 The ACA Through Presidential Administrations

The uneven implementation of the ACA has at times been even more conspicuous at the federal level when looking across the three presidential administrations since the law's passage.

President Obama's second term in office was focused on rolling out the main coverage provisions of the ACA that went into effect in 2014 – the expansion of Medicaid and implementation of subsidized coverage in the Marketplaces. While the Obama Administration was invested in the rollout of the law, they faced multiple implementation challenges. Because the Marketplaces became a primary venue of state-level resistance to the law – with a fewer number of states opting to establish their own Marketplaces than anticipated – the federal government was left to operate the Marketplaces across most parts of the country. The botched rollout of *HealthCare.gov* – when technical glitches on the federal platform prevented people from signing up for coverage – initially reduced enrollment in coverage. Moreover, while the administration did repair the glitches, the fiasco ended up tainting public opinion of the law (Oberlander 2016). In fact, public support for the law never reached 50 percent during the Obama Administration (Oberlander and Weaver 2015). Additionally, the uneven take-up of Medicaid expansion – which persisted despite the Administration's encouragement of state-led

innovation waivers – also limited the coverage expansions in a way that was not anticipated upon the law's passage. Despite these obstacles, between 2013-2016 – Obama's second term in office – the number of uninsured Americans dropped from about 44 to 28 million, representing a roughly 35 percent reduction in uninsurance, the most significant reduction since the creation of Medicare and Medicaid in the 1960s (Blumenthal, Collins, and Fowler 2020).

President Trump then took office after campaigning to repeal and replace the ACA as the cornerstone of his health reform agenda. Interestingly, the ACA's popularity reached 50 percent for the first time since its enactment around the time Trump assumed the presidency (KFF 2024). Public support for repealing the law also experienced its first statistically significant drop just after Trump's election at the end of 2016 (Hopkins 2023). Although efforts to repeal the law ultimately failed, President Trump's arrival to the White House in 2017 marked the first attempt to undermine the law through federal executive action. Most notably, the Administration slashed spending on Marketplace outreach (GAO 2018), reducing it by 90 percent in 2017 compared to spending by the Obama Administration in 2016. The Trump Administration also reduced funding for navigators (organizations and individuals designated to assist people applying for coverage) by roughly 40 percent in 2017, shortened the open enrollment period from 3 months to 45 days, and relaxed some of the ACA protections through greater flexibility for short-term insurance plans (Goodnough and Pear 2017; Gaba and Gee 2020).[4]

The Trump Administration stymied the reach of social safety net programs more broadly, including Medicaid, through its proposed broadening of the public charge rule, which likely had a chilling effect on program participation among households with mixed immigration status (Artiga, Garfield, and

[4] The Administration also ended payments to insurers for cost-sharing reductions, which were designed to lower Marketplace enrollees' out-of-pocket costs (Sprung and Anderson 2018). But these efforts largely backfired: to make up for the lost funding from Congress, insurers dramatically increased the premium costs for their silver plans to cover the cost of the cost-sharing subsidies (also known as "silver loading") and as these premiums increased, so did premium tax credits (Drake and Anderson 2020a). Research suggests that these efforts likely led to *increased* enrollment in subsidized marketplace coverage, as opposed to limiting Marketplace coverage as the Administration anticipated (Drake and Anderson 2020b).

Damico 2019).[5] The Administration also encouraged states to take up Medicaid "community engagement requirements" (also known as "work requirements") during its tenure (Pear 2018). When implemented, these policies resulted in significant coverage losses due to administrative barriers to maintaining coverage without yielding significant improvements in employment (Sommers et al. 2019). The individual mandate tax penalty was also zeroed out under the Trump Administration, although previous evidence suggests that the federal mandate was not a key contributor to the law's coverage expansion effects (with some evidence for modest effects tied more closely to the existence of any mandate rather than the specific penalty amount) (Frean, Gruber, and Sommers 2017; Saltzman 2019; 2021). Overall, during the first three years of the Trump Administration, the US experienced the first uptick in uninsurance since the enactment of the ACA, despite a robust economy. Between 2017-2019, as the share of the nonelderly population without coverage increased from 10.7 to 12.0 percent (NHIS 2024).

Starting in 2020, the US experienced a significant expansion of its social safety net, enacted through bipartisan legislation as a response to the COVID-19 pandemic. Signed into law by President Trump, the Families First Coronavirus Response Act contained a provision that prevented states from disenrolling Medicaid beneficiaries from their programs as a condition of receiving enhanced temporary funding (Musumeci 2020). This continuous coverage provision was in place for the majority of President Trump's final year in office and remained in effect until April 2023, leading to marked growth in Medicaid enrollment, although research suggests that low levels of policy awareness among enrollees

[5] The public charge rule was a preexisting immigration policy through which the Department of Homeland Security (DHS) could deny entry or adjustments to legal permanent resident status to individuals it deemed could become a "public charge" to the U.S. based on anticipated use of public benefits. Certain immigrants – including refugees and asylum seekers – are exempt from public charge determinations. The Trump Administration's new rule would have allowed DHS to consider the use of previously excluded noncash assistance programs – including Medicaid – in public charge determinations (KFF 2019).

may have partially limited its impact (McIntyre, Smith, and Sommers 2024; Ding, Sommers, and Glied 2024).

President Biden was elected in 2020, and strengthening the ACA served as the centerpiece of his health care agenda. The Biden Administration made significant investments in strengthening both Medicaid and the Marketplaces through several policies. Regarding Medicaid, the Administration invested significant resources to prevent the loss of coverage during the "unwinding" of the Medicaid continuous enrollment provision (Medicaid.gov 2024), and it more generally supported state efforts to streamline enrollment and retention in the program including by eliminating administrative barriers such as work requirements (Diamond and Goldstein 2021). Finally, policies were implemented to encourage additional states to expand Medicaid, including offering a temporarily enhanced federal matching rate under the ARP to new expansion states (Coleman 2021).

To strengthen Marketplace enrollment, the administration established a COVID-19-related special enrollment period in 2021 for individuals seeking Marketplace coverage and made the largest financial investment to date in outreach efforts and navigator organizations to help individuals sign up for coverage (CMS Newsroom 2021). Most notably, in March 2021, Congress passed the ARP, which expanded Marketplace subsidies to people making above 400 percent of the FPL (eliminating the "subsidy cliff" for higher-income individuals) and enhanced subsidies for individuals between 100 and 400 percent of the FPL who were already eligible for subsidized Marketplace coverage (McDermott, Cox, and Amin 2021). After these policies were put in place, the amount that individuals had to contribute towards Marketplace premiums was capped at 8.5 percent of income. These expansions were set to last for two years, and in 2022 Congress passed the IRA, which extended the temporary subsidies through the end of 2025 (Ortaliza et al. 2024).

Finally, in 2023, the Biden Administration fixed the "family glitch," redefining 'affordability' of employer-sponsored health insurance to include the cost of family coverage.[6] This change was projected to lead to about 1 million individuals enrolling in subsidized Marketplace coverage (Keith 2022).

All told, under the Biden Administration, enrollment in Marketplace coverage reached the highest it has ever been, with 24 million individuals signing up during President Biden's last year in office, compared to about 13 million and 11 million at the end of the Obama and Trump Administrations, respectively (CMS Newsroom 2025; Cox and Ortaliza 2024). Enrollment in Medicaid and the Children's Health Insurance Program – fueled to a large extent by the continuous coverage provision – reached an all-time high of 95 million, though this declined to 85 million by 2024 after the unwinding of this provision (KFF 2025). By early 2023, the uninsured rate among the nonelderly population reached an all-time low, at 8.9 percent (NHIS 2024).

2.4 The Existing Literature on Coverage Changes since the ACA's Enactment

A voluminous body of work has documented the coverage gains from the ACA over the past decade. While the descriptive reductions in uninsurance have been well documented, there has been less research disentangling which policies mattered most and how these patterns have varied across different presidential administration and state implementation environments.

Most of the work that examines specific provisions of the law has focused on the effects of the ACA's Medicaid expansion (see Guth and Ammula 2021 for an overview), largely due to the state variation in expansion decisions, which lends itself well to quasi-experimental study designs. While these studies provide valuable insights into the effects of Medicaid expansion, they analyze the effects of

[6] Prior to this change, the ACA's employer-shared responsibility provision – which requires certain employers to offer "affordable" coverage (i.e., coverage with premiums that did not exceed about 9 percent of the employee's income) or pay an employer-shared responsibility payment to cover employees who get subsidized Marketplace coverage – only applied to the cost of coverage available to the employee. If an employee had a family, the cost of the premium(s) for the family's coverage was not considered in the determination of "affordability." This was oftentimes referred to as the "family glitch." Starting in 2023, employees' premium contributions for self-only coverage *and* for family coverage are compared to the affordability threshold (Pestaina and Pollitz 2022).

Medicaid expansion on its own (i.e., not in tandem with the effects of Marketplace coverage). This body of work typically also does not distinguish between coverage gains from *new* eligibility from the law, and gains among those who were already eligible for Medicaid prior to the ACA's implementation (oftentimes referred to as the "woodwork" or "welcome mat" effect), providing us with an incomplete understanding of how the law has worked to get people covered.

Work examining the nationwide effects of the availability of subsidized coverage through the Marketplaces is more limited.[7] While Marketplace enrollment has now surpassed the number of people who are a part of the Medicaid expansion population (Tolbert et al. 2025), it initially accounted for a smaller portion of ACA-related coverage gains, leading to comparatively less attention from researchers. Moreover, coverage type misreporting on federal surveys often used to analyze coverage trends complicate analyses of Marketplace coverage gains in particular. While states with SBMs are typically thought to have a larger impact on Marketplace enrollment to increased investments from the state relative to states using the FFM (Schwab, Swindle, and Giovannelli 2022), there is also limited evidence examining the effectiveness of the Marketplace subsidies in reducing uninsurance across these sets of states.

We know even less about the enhanced and extended ARP subsidies have affected the coverage landscape.[8] Recent estimates from the Congressional Budget Office project an increase of over 2 million individuals without insurance in 2026 if the ARP tax credits expire (CBO 2024), and the dramatic increase in Marketplace coverage since 2021 suggests the ARP has played a role in increasing enrollment (Ortaliza et al. 2024), though these changes are also concurrent with other administrative efforts to

[7] While researchers are able to access individual-level administrative and enrollment data for the Medicaid program, individual-level Marketplace data are only collected at the state level. Thus, the studies that do exist on the specific effects of the Marketplace subsidies are largely state-specific. For example, Finkelstein, Hendren, and Shepard (2019) and Tebaldi (2025) examine the effects of the subsidy schedule on take-up of Marketplace coverage in Massachusetts and California, respectively.

[8] One study examined the effects of the ARP subsidies in Medicaid non-expansion states only (Katsikas and Mukhopadhyay 2023).

expand coverage and boost enrollment. Furthermore, we have limited evidence on how the ARP changes have reduced uninsurance and whether they led to any "crowd-out" of employer-sponsored insurance. Additionally, as with the regular ACA subsidies, little is known about how the ARP subsidies have impacted different states (such as those that have SBMs versus those that use the FFM).

We fill these gaps in the literature in three ways. First, building on prior work (Frean, Gruber, and Sommers 2017), we decompose the coverage effects of the law, attributing reductions in uninsurance to ACA-related policy variables – namely, the Medicaid expansion, Medicaid welcome mat effect, ACA Marketplace subsidies, and the additional ARP subsidies. Second, we examine how the law has fared across three presidential administrations (Obama 2012-2016, Trump 2017-2020, and Biden 2021-2024), shedding light on the consequences of varying federal oversight of the law. Third, we compare how each of the ACA's main policies fared across states that have made different choices related to the law (i.e., whether establish an SBM).

3. DATA, POLICY MEASURES, AND EMPIRICAL APPROACH

3.1 Data

Our primary data source is the American Community Survey (ACS), the US Census Bureau's largest national household survey sampling about 3.5 million households annually. The ACS is among the federal surveys regarded as the gold standard for health insurance coverage estimates. Crucially, for our analysis, the ACS provides geographic information about household location at a substate level, namely the public use microdata area (PUMA) level, the lowest level of geography identified in Census surveys. PUMAs comprise nonoverlapping contiguous areas within each state and have populations of at least 100,000 individuals. This granular level of geographic grouping is particularly useful for our analysis of Marketplace coverage subsidies given the substantial variation in Marketplace premiums (and thus subsidies) across and within states (Holahan, Wengle, and O'Brien 2023). We use ACS data from 2013,

2016, 2019 and 2023 to capture key moments in the evolution of the ACA; we discuss these choices in Section 3.3 below.

Every 10 years, the Census redraws PUMA boundaries based on population information from the most recent decennial census. New PUMA boundaries were implemented in the 2022 ACS data using population information from the 2020 Census, limiting our ability to analyze the full set of data across the decade period 2013-2023. However, we were able to map the old (pre-2022) PUMA boundaries to the new (2022-) PUMA boundaries using a crosswalk from the Missouri Census Data Center, identifying PUMAs with populations that remained largely unchanged after the implementation of new decennial census boundaries. We defined "unchanged" PUMAs as those where at least 90 percent of the population remained the same before and after the boundary changes, as well as those PUMAs that were simply old areas divided into two new PUMAs to reflect population growth. About 73 percent of our population-weighted sample in each year (representing all 50 states and Washington DC) met this criteria and were thus included in our primary analyses. Appendix A.1 contains information on the composition of HIUs in PUMAs included in our analysis, compared to those that are not. To ensure the exclusion of these PUMAs are not biasing our results, in Appendix A.2 we conduct a sensitivity analysis running our model on the full set of data (i.e., without dropping any PUMAs) before the PUMAs were redrawn (2013, 2016, and 2019). We then compare these estimates to when we run our model for those same years on just the subset of our data that are included in our primary analysis (i.e., households in "unchanged" PUMAS), and we find that the results are quite similar.

The ACS contains our primary dependent variable of interest – the share of the population without insurance – as well as other health insurance outcomes included in our analysis, including the share of the population with Medicaid or non-group/Marketplace coverage (which we combine into a single measure for reasons explained in Section 3.3), and employer-sponsored insurance (ESI). We collapse the individual-level ACS data to the "health insurance unit" (HIU)-level, which we define as an

adult, their spouse, and their dependent children in the household, excluding unrelated roommates or other adult relatives such as grandparents. We use "HIU" and "family" interchangeably below. We limit our analysis to individuals and members of families who are between the ages of 0-64, as most people 65 and older have Medicare coverage, and are thus unaffected by the ACA's (and ARP's ACA-related) health insurance coverage provisions.[9]

Finally, given concerns about the imprecision of self-reported survey income, as well as the potential endogeneity of income and employment with respect to the ACA's policies that feature income-based eligibility, we use *predicted* income to estimate eligibility for each of our policy measures. Appendix B contains the regression specification we use to develop our predicted income measures, which used fixed person-level demographics such as whether a family has children (and the number of children, if applicable) and the age of the head(s) of a family to generate an estimated income that was then converted to the share of the FPL using year-specific FPL thresholds from the U.S. Department of Health & Human Services.[10]

3.2 Policy Measures

We assess the impact of the original ACA coverage provisions and ARP subsidies on coverage outcomes using five policy parameters in 2016, 2019, and 2023:

Medicaid Eligibility

We construct two measures of Medicaid eligibility. The first is a measure of Medicaid eligibility *prior* to the implementation of the ACA. While the law made adults without disabilities or dependent children – a group that was entirely ineligible for Medicaid before the ACA in most states – eligible for coverage up

[9] If a HIU is only comprised of people 65 years or older, it is excluded from our analysis. If a HIU is comprised of individuals both younger than and at least 65 years old, health insurance coverage eligibility is only calculated for those younger than 65.

[10] When calculating a HIU's income relative to the FPL, all members of the HIU – and their income – are included in the calculation, regardless of the individual's age.

to 138 percent of the FPL, it left eligibility for other groups of individuals, namely children, adults with dependents, those with disabilities, and pregnant individuals largely unchanged. However, the new expansion of Medicaid was anticipated to increase enrollment in Medicaid among those who were already eligible as a result of new awareness and outreach surrounding the ACA (Sommers and Epstein 2011). Research has found this "welcome mat" or "woodwork" effect to be particularly pronounced among pre-ACA Medicaid-eligible children with parents who became newly eligible through the law (Hudson and Moriya 2017). We assess the ACA's welcome mat effect through a "pre-ACA Medicaid eligible" measure.

The second Medicaid measure captures the increased eligibility from the ACA's Medicaid expansions, reflecting new eligibility among adults without disabilities or dependent children, as well as parents and people with disabilities whose income was below their state's pre-ACA thresholds for those groups. We call this our "newly Medicaid eligible" measure. Both measures of Medicaid eligibility are constructed using state-specific eligibility criteria for each eligibility group (adults without disabilities or dependent children, parents of dependents, children, and those with disabilities) collected by KFF's Medicaid eligibility surveys. To identify those with disabilities, we use the ACS's disability indicator, which pulls from the ACS's six-item set of questions about disability status.[11]

We distinguish between these two measures of eligibility for two reasons. First, decomposing the effects of the Medicaid coverage gains as a result of the ACA allows us to accurately assess how much of the gains came from the expansion of eligibility itself, which is important to know as policymakers interpret the broader evidence on Medicaid expansion. Second, this distinction allows us to see if changing presidential administrations affect these measures differentially.

[11] Note that we exclude pregnancy-only coverage available through Medicaid, since the ACS does not include information on pregnancy status.

Overall, we have a total of four Medicaid eligibility variables: "pre-ACA Medicaid eligible" (which does not change across years) and "newly Medicaid eligible" in 2016, 2019, and 2023, to reflect the changes in eligibility over time as more states picked up the Medicaid expansion.

Marketplace Premium Subsidies

We construct two measures of financial assistance afforded by Marketplace coverage subsidies — one under ACA and the other under ARP rules. As in prior work (Frean, Gruber, and Sommers 2017), our Marketplace coverage subsidy measure is the "HIU percent subsidy," defined as:

Pct Subsidy = 1 – (HIU net premium/HIU unsubsidized premium).

The net premium is the premium amount the HIU is responsible for covering after they receive a subsidy, if eligible. The unsubsidized premium amount is the full premium amount the HIU would be responsible for covering if they were ineligible for a subsidy. If a HIU's percent subsidy is equal to 0 it means they are ineligible for a subsidy; if a HIU has a subsidy equal to 1 it means their coverage is completely subsidized. We use a HIU's percent subsidy to measure subsidy generosity because of the variation in Marketplace premiums across and within states, as well as across age groups. The HIU percent subsidy measure provides us with a standardized way to assess the financial assistance afforded to individuals with subsidies for Marketplace coverage, and was also found in prior research to be a stronger predictor of coverage behavior than net premiums (Frean, Gruber, and Sommers 2017).

To construct the HIU percent subsidy measure, we use the Robert Wood Johnson Foundation's publicly available HIX Compare dataset, which contains premium information on nearly every individual Marketplace plan in every rating area (the geographic area at which premium costs are set). The HIX Compare dataset contains unsubsidized premium information for a 27-year-old in each rating area, which we then convert to age-specific premiums using the federal standard age curve from the Centers for Medicare and Medicaid Services, and state-specific age curves when applicable (CMS 2024). The age-adjusted premiums are based on the second lowest-cost silver plan in a given rating area, the plan

against which both the ACA's and ARP's premium tax credits are benchmarked. We then matched the unsubsidized premium amounts to individuals in the ACS using a rating area-county-PUMA crosswalk, using population-weighted premium averages if multiple rating areas spanned one PUMA. Because we are conducting our analysis at the HIU level, we then summed the individual unsubsidized premiums for every member of the HIU (with premiums for no more than three children included in the sum, based on federal regulations) to determine the HIU's full unsubsidized premium.

We calculate a HIU's net subsidy first under the ACA rules in each of the post-ACA years (2016, 2019, and 2023) and then under the ARP rules (2023 only). Details about the yearly premium contribution requirements are included in Appendix C. To calculate the additional financial assistance a HIU receives from the ARP subsidies relative to the ACA subsidy schedule, we take the difference between our two percent subsidy measures (i.e., [1 - (HIU net premium under ARP rules/HIU unsubsidized premium)] - [1 - (HIU net premium under ACA rules/HIU unsubsidized premium)]). We call the additional ARP percent subsidy HIUs receive "ARP HIU Added Percent Subsidy," and the original ACA HIU percent subsidy "ACA HIU Percent Subsidy."

Overall, we have a total of four Marketplace variables: "ACA HIU percent subsidy" in 2016, 2019, and 2023, and "ARP added HIU percent subsidy" in 2023.

Mandate

Unlike the Medicaid and Marketplace variables, which we estimate separately for each year of data, we estimate only a single mandate policy variable in our analysis, across all years. The reason for this is that in our first year of data (2013), only one state (Massachusetts) had a mandate, and in each of our comparison study years except 2016 (2019 and 2023), between 3 to 5 states and DC had a mandate

in place.[12] The limited variation in state-level mandates would make it challenging to interpret the effect of a state-time mandate policy indicator in each of our comparison years. Thus, instead of creating yearly mandate indicators, we create one indicator (called "Mandate in Effect") indicating whether a state had a mandate in effect in a given year. Our mandate variable is not as well-identified as our other policy variables, as it may proxy for other pro-coverage policies (if a state chooses to adopt a mandate, it is likely to also be implementing other efforts to encourage take-up of coverage relative to other states). To assess whether the mandate policy variable is picking up the effects of other pro-coverage policies – or if the penalty itself has an effect on coverage outcomes – we also model the actual penalty amount when applicable (depending on the state and year) in a sensitivity analysis.

3.3 Empirical Approach

Our empirical approach uses variation in place, time, and predicted income to evaluate the impact of the three most recent presidential administrations on each of our policy outcomes. We implement a difference-in-difference-in-difference (DDD) model across these three dimensions. Our study period spans a decade, from 2013 (the year prior to the implementation of the main coverage provisions of the ACA) to 2023.

We first construct a model to examine the effects of the ACA's main components and the recent enhancement via the ARP over time. In particular, we model insurance coverage as a function of policy variables for an end date (2023 in the first case) in both the 2013 baseline year and that end date. In this framework, the coefficients for the baseline year pick up any cross-sectional differences across income and geography that are correlated with our policy parameters (and not captured by our other controls), while the coefficients for the end dates (interacted with an indicator for the post-policy year) pick up the causal impact of policy.

[12] In 2013 (our baseline year), Massachusetts was the only state with a mandate; in 2016 all states and DC had a mandate; by 2019 Massachusetts, DC, and New Jersey had a mandate; by 2023, California, Rhode Island, and Vermont also had a mandate.

More specifically, our primary specification to measure the effect of each policy measure on uninsurance outcome in a two-year model that compares 2013 versus 2023 is as follows:

$$PctUninsured_{ipt} =$$

$$\beta_0 + \beta_1 PreACA\_McaidElig_{ip} + \beta_2 McaidNewlyElig2023_{ip} + \beta_3 ACA\_PctSubsidy2023_{ip}$$

$$+ \beta_4 ARP\_AddedPctSubsidy2023_{ip}$$

$$+ \beta_5(PreACA\_McaidElig_{ip} * 2023_t) + \beta_6(McaidNewlyElig2023_{ip} * 2023_t) + \beta_7(ACA\_PctSubsidy2023_{ip} * 2023_t)$$

$$+ \beta_8(ARP\_AddedPctSubsidy2023_{ip} * 2023_t)$$

$$+ \beta_9 Mandate + (\gamma_p * HIU_{Type_i}) + (\delta_t * HIU_{Type_i}) + (\lambda_i * HIU_{Type_i}) + X_{ipt} + \epsilon_{ipt} \quad \textbf{(1)}$$

where $PctUninsured$ is the share of family i without insurance in PUMA p in year t (this outcome variable ranges continuously from 0 to 1, but simplifies to a binary variable when the family is a single person). $PreACA\_McaidElig$ and $McaidNewlyElig2023$ represent the share of the family that was eligibility for Medicaid before the ACA and the share newly eligible as a result of the ACA, respectively. $ACA\_PctSubsidy2023$ represents the family's percent subsidy measure for Marketplace coverage in 2023, under the original ACA subsidy rules. $ARP\_AddedPctSubsidy2023$ represents the family's additional percent subsidy (relative to the household's ACA subsidy) for Marketplace coverage 2023. $Mandate$ is a binary indicator representing whether the family was in a state in a given year with a mandate in effect. γ represents PUMA fixed effects, δ represents year fixed effects, and λ represent income group[13] fixed effects. Each set of fixed effects is interacted with HIU type (HIU_Type) – single adult, adult couple, or household with kids – because each HIU type may be differentially affected by coverage policies. Finally, X is a vector of controls representing demographic characteristics of the head(s) of a family including race and ethnicity, age, education level, US citizenship status, and employment status, as well as the number of children in a family if applicable.

[13] Income was defined based on the HIU's predicted percent of the federal poverty level, which we defined using the following 12 bins: <0.5; 0.5-1.00; 1.00-1.38; 1.38-2.00; 2.00-2.50; 2.50-3.00; 3.00-3.50; 3.50-4.00; 4.00-5.00; 5.00-6.00; 6.00-8.00; 8.00+.

Coefficients β_1 through β_4, conditional on all of the fixed effects and control variables, capture the "pre-period" impacts of any policies, which should incorporate time-unvarying omitted correlations between the policy variables and the outcome. β_5 through β_8 are our primary coefficients of interest, the interactions between each policy period and 2023. That is, β_7 captures the impact of the marketplace subsidy rate in 2023 on 2023 coverage; β_3 captures the impact of the marketplace subsidy rate in 2023 on 2013 coverage, which represents the effect of any omitted correlates of the 2023 variable which are constant over time. By controlling for the 2013 interaction we purge the model of those omitted correlates and focus on the causal effect in 2023. β_9 represents the effect of having an insurance mandate in effect in a given state and year. We use ACS household-level survey weights and robust standard errors are clustered at the PUMA level in every model.

This approach addresses the possibility that a policy measure is correlated with unobserved determinants of insurance status, even conditional on our rich set of controls — for example, because the policy depends on a particular non-linear function of income not captured in our income controls that drives insurance decisions. So long as that correlation between the non-linear function of income and insurance is constant over time, it will be captured in the baseline coefficient – so that that the interaction with a later year can be interpreted causally.

After assessing the full effects of each policy variable since the ACA's implementation, we then build on the above model to compare the effect of each policy under varying presidential administrations. To do this, we use a single equation to compare the baseline year (2013) to each of three subsequent data points, using the last year of high-quality data we have for each presidential administration: 2016, the last year of the Obama administration, reflecting the "full implementation" of the law as originally passed; 2019, the last year of data under President Trump's first term that was not affected by data quality issues from the pandemic (which the Census Bureau identified as a problem in

its 2020 data); and 2023, the final year of data currently available for the Biden Administration, which also reflects the implementation of the ARP subsidies.

Building on equation 1, our primary specification to measure the effect of each policy measure on coverage outcomes in each time period is as follows, where we now adjust for baseline policy parameters for all the years of data at once, and then interact each policy variable with the relevant year to trace out differential effects for 2016, 2019, and 2023:

$$
\begin{aligned}
Y_{ipt} &= \beta_0 + \beta_1 PreACA\_McaidElig_{ip} \\
&+ \beta_2 McaidNewlyElig2016_{ip} + \beta_3 ACA\_PctSubsidy2016_{ip} \\
&+ \beta_4 McaidNewlyElig2019_{ip} + \beta_5 ACA\_PctSubsidy2019_{ip} \\
&+ \beta_6 McaidNewlyElig2023_{ip} + \beta_7 ACA\_PctSubsidy2023_{ip} + \beta_8 ARP\_AddedPctSubsidy2023_{ip} \\
&+ \beta_9 (PreACA\_McaidElig_{ip} * 2016_t) + \beta_{10} (McaidNewlyElig2016_{ip} * 2016_t) + \beta_{11} (ACA\_PctSubsidy2016_{ip} * 2016_t) \\
&+ \beta_{12} (PreACA\_McaidElig_{ip} * 2019_t) + \beta_{13} (McaidNewlyElig2019_{ip} * 2019_t) + \beta_{14} (ACA\_PctSubsidy2019_{ip} * 2019_t) \\
&+ \beta_{15} (PreACA\_McaidElig_{ip} * 2023_t) + \beta_{16} (McaidNewlyElig2023_{ip} * 2023_t) + \beta_{17} (ACA\_PctSubsidy2023_{ip} * 2023_t) \\
&+ \beta_{18} (ARP\_AddedPctSubsidy2023_{ip} * 2023_t) \\
&+ \beta_{19} Mandate + (\gamma_p * HIU\_Type_i) + (\delta_t * HIU\_Type_i) + (\lambda_i * HIU\_Type_i) + X_{ipt} + \epsilon_{ipt}
\end{aligned}
\qquad \textbf{(2)}
$$

where Y is our coverage outcome of interest, for example, the share of family i without insurance in PUMA p in year t. Coefficients β_1 through β_8 represent our baseline direct effects of the PUMA-income policy variables; as before, these are included to capture any omitted effects of these policies, so that the latter coefficients can be interpreted causally. β_9 through β_{18} are our primary coefficients of interest, the interactions between each policy parameter and each post-implementation period. In most of our analyses, our primary outcome of interest is the share of a family without insurance ($PctUninsured$).

We also model two other coverage outcomes with analogous models, simply replacing the dependent variable with the share of a family with (1) Medicaid and/or non-group coverage (which includes Marketplace coverage) and (2) ESI. When evaluating the effects of our policy variables on

alternative coverage outcomes, we combine respondents who select the ACS' "Medicaid, Medical Assistance, or any kind of government-assistance plan for those with low incomes or a disability" with those who select "Insurance purchased directly from an insurance company" into one category. Prior work suggests that respondents with subsidized Marketplace coverage may select the "Medicaid, Medical Assistance, or any kind of government-assistance plan for those with low incomes or a disability," which plausibly includes government-subsidized Marketplace coverage (Boudreaux et al. 2015; Frean, Gruber, and Sommers 2017).

We then conduct post-estimation testing for differences in the policy coefficients across the three administrations for pre-ACA Medicaid eligible, newly Medicaid eligible, and ACA Marketplace subsidy; since the ARP subsidies only existed in 2023, we could not test for cross-administration differences.

To test the underlying assumptions of our DDD model, we also conduct an event-study regression, in which we add a second baseline year (2012) to the sample. This analysis uses a similar model to equation 1, with the addition of policy interaction terms with indicators for the year 2012 (we include our event-study specifications in Appendix D). This allows us to assess whether any residual correlation between our baseline policies and our coverage outcomes exhibiting a diverging pre-ACA trend in 2012 and 2013. If the coefficients for the 2012 interactions are close to zero, this suggests that our DDD model's post 2013 changes are indeed identifying causal changes due to these policies, rather than coverage differences that were already diverging before the ACA. Prior to 2012, the ACS PUMA boundaries were different, so we were not able to extend the baseline study period back further.

Lastly, we examine the heterogeneity of our policy measure across SBM and FFM states. Due to the complexity of our model — and the fact that SBM states vary over time (including several states that switch back and forth between running a SBM and using the federal platform) during our study period — we run a version of equation 1 on SBM and FFM states separately, only including data from our

baseline year and each comparison year (i.e., 2013 vs. 2016; 2013 vs. 2019; and 2013 vs. 2023), stratified by SBM and FFM states. We include details on our state-group heterogeneity models in Appendix E.

4. RESULTS

4.1 Policy Measures and Coverage Trends Over Time

The top panel of Table 1 contains summary statistics from each of our policy measures in 2016, 2019, and 2023 – generated using actual (not predicted) HIU income. The share of the population that was eligible for Medicaid prior to the ACA (under 2013 Medicaid eligibility rules) has slightly decreased over time, from 23.0 to 18.7 percent of the population between 2016 and 2023, reflecting trends in increasing family income over time as a share of the federal poverty level.[14] The share of the population who became newly eligible for Medicaid under the ACA remained relatively steady during our study period. While more states have taken up Medicaid expansion over time, the increasing family income over time as a share of the federal poverty level wash out the increases in the expansion population in our policy means. There is also some variation in our ACA percent subsidy measure over our study period, reflecting mostly changes in the cost of insurance over time (as shown by the changes in the unsubsidized premium cost over time).[15] In particular, we see a jump up in the share of a HIU's premium that is eligible for a subsidy between 2016 and 2019 (15.1% to 18.5%), and then back down in 2023 (15.5%). In 2023, the ARP subsidies results in an additional 11.9 percentage-point reduction in the average share of a HIU's premium costs it is responsible for. This means that in 2023, the average combined HIU percent subsidy was 27.4 percent.

[Table 1 about here.]

[14] This is true both in the true HIU federal poverty measure and in our predicted HIU federal poverty measure. The true average HIU FPL was 3.58, 3.81, 4.10, and 4.30 in 2013, 2016, 2019, and 2023, respectively. Our predicted average HIU FPL was 3.60, 3.83, 4.13, and 4.32 in 2013, 2016, 2019, and 2023, respectively.

[15] The same trends are reflected in the unweighted average benchmark premium costs for an individual over time (see KFF, "Marketplace Average Benchmark Premiums, 2014-2025").

The bottom panel of Table 1 presents the time series changes in our primary insurance coverage outcomes between 2013 and 2023. The uninsured rate dropped the most dramatically between 2013 and 2016, following the implementation of the ACA's primary coverage provisions, from 17.4 to 10.7 percent. In 2019, there was a slight uptick in the share of the population without insurance (11.6%), and by 2023, the uninsured rate was the lowest on record at 10.0%. This drop in the uninsured rate generally tracked with increased rates of Medicaid and non-group/Marketplace coverage, which increased the most dramatically between 2013 and 2016, from 26.9 to 32.8 percent. It then dropped in 2019 to 30.4 percent and went back up in 2023 to 33.5 percent. The share of the population with employer-sponsored insurance rose steadily but modestly during our study period, from 56.3 to 59.3 percent between 2013 and 2023.

4.2 Overall ACA Coverage Effects in 2023

Table 2 shows the results for three versions of our primary model (equation 1), evaluating the impact of each ACA policy parameter in 2023 vs. 2013, after a full decade of the law's coverage provisions being in effect. It also shows the impact of eligibility for the more recent ARP subsidies enhancements on uninsurance. We only show the coefficients or our interactions of interest. The full regression specification results are included in Appendix F.

[Table 2 about here.]

Column 1 shows the results from equation 1 modeled at the HIU-level – our preferred level of analysis. The coefficient on the interaction between 2023 and our ACA HIU percent subsidy measure – representing the reduction in uninsurance among families eligible for subsidized coverage through the Marketplaces between 2013-2023 – is highly significant. It suggests that a 1 percentage-point increase in a family's percent subsidy amount is associated with a 0.07 percentage-point reduction in uninsurance. Said differently, each 10 percentage-point increase in the average ACA subsidy resulted in a decrease in the uninsured rate of over two thirds of a percentage point (0.68 percentage points) in 2023.

The interaction between 2023 and our ARP added HIU percent subsidy measure – which represents the reduction in uninsurance among those eligible for the enhanced subsidies through the ARP – indicates a very similar 0.068 percentage-point reduction in uninsurance for each *additional* percentage-point of percent subsidy a family receives from the ARP, on top of the ACA HIU percent subsidy level. The ARP effect on uninsurance is comparable in size to the original ACA subsidy's effect, indicating that these enhancements have played a significant role in reducing coverage among the remaining uninsured.

The coefficient on the interaction between 2023 and the newly Medicaid eligible measure indicates that there was a 9.8 percentage-point drop in uninsurance between 2013-2023 among those made eligible for Medicaid through the ACA. The coefficient on the interaction between 2023 and our previously-Medicaid eligible variable – the welcome mat effect – is smaller than the newly Medicaid eligible coefficient but still highly significant, indicating that there was a 1.91 percentage-point additional reduction in uninsurance among those who were already eligible for Medicaid because of the ACA.

The coefficient on our pooled mandate policy variable indicates that there was a 3.88 percentage-point reduction in the likelihood of uninsurance among HIUs in states that adopted an individual mandate following the zeroing out of the federal mandate. Because our mandate variable is not as well-identified as our other policy variables and is a simple indicator potentially confounded with other state-level policy choices, it may also be picking up broader pro-coverage policies in the states that implemented their own mandate. We provide some evidence of this in Appendix G, where we include the actual HIU-level penalty amount as a policy variable in our model. In Column 1, we include the HIU-level mandate amount in addition to our pooled mandate-in-effect indicator; in Column 2 only include the HIU-level mandate amount and drop the mandate-in-effect indicator. Both specifications have similar results; our description here focuses on Column 1. Our results suggest that the HIU penalty

amount is associated with a negligible *increase* in the likelihood of uninsurance. Thus, the inclusion of the HIU-level mandate penalty amount (in $100s) leads to a *larger* effect size on our mandate-in-effect variable, suggesting that the mandate's presence is likely a proxy for state-level pro-coverage policies, since the mandate amount itself is negatively associated with insurance coverage. This is also consistent with previous research that suggested the presence of any mandate was a stronger predictor of coverage choices – potentially via a "taste for compliance" – rather than the details of the mandate penalty amount, which had modest effects if any (Saltzman 2019; 2021).

While the Marketplaces were established in all states in 2014, as discussed earlier, there has been variation in timing of state adoption of Medicaid expansion. To address concerns about the inclusion of later (i.e., post-2014) expanders biasing our results due to staggered treatment timing, Appendix H includes results from a sensitivity analysis where we run the same model (equation 1), only on the states that immediately expanded in 2014 and those that still had not expanded by 2023. Our results from Table 2 Column 1 and our sensitivity analysis in Appendix H are quite similar. The magnitude of our effect sizes in our primary model are slightly smaller than the effect sizes we find in our sensitivity analysis, suggesting that, if anything, the inclusion of the whole set of states leads to more conservative estimates of the effects of the law on coverage outcomes.

Columns 2 and 3 contain alternative specifications of our primary model that allow us to examine whether the unit of observation, as well as some omitted interaction terms, may be affecting our results. Column 2 shows the same model used in Column 1, collapsed to the PUMA-Income-HIU Type level. Column 3 also shows the same model used in Column 1, collapsed to the PUMA-Income-HIU Type-Age level, and allows for an interaction between HIU Type and age categories. Both models give us similar results to when we run the analysis at the HIU level.

As noted above, our key identifying assumption in this model is that any correlations between the policy variables and omitted determinants of insurance coverage are presumed to be captured by

the baseline coefficients on the policy variables. We test this assumption by adding to our model an interaction with an additional pre-ACA year, 2012. This allows us to graph any "pre-trends" in the relationship between our subsequent policy measures and insurance coverage.

Figure 1 shows our event study figures, where we estimate the effect of each policy measure on uninsurance in 2012 and the comparison year (2016, 2019, or 2023), all relative to 2013. The coefficients on both of our HIU percent subsidy measures in 2012 are not statistically different than zero, suggesting the effect we observe in the post-ACA years for the HIU percent subsidy measures represent the causal effect of the subsidy measures on uninsurance. The coefficients on pre-ACA Medicaid eligible are also not statistically different than zero, also suggesting the effect we observe in the post-ACA years for the pre-ACA Medicaid eligible measures represent the causal impact of the welcome mat effect on uninsurance. Finally, the newly Medicaid eligible measures are also small in 2012 (all less than 0.01), though statistically significantly different than zero. These small non-zero effects may represent anticipation in 2012 of the impacts of a law passed in 2010 but not effective until 2014 (and several states did enact partial early expansion of Medicaid between 2010-2013, see Sommers et al. 2013); in any case, they are very small relative to the effects in 2016, 2019 and 2023.

[Figure 1 about here.]

4.3 Differential Policy Effects Under Different Administrations

Figure 2 shows our results from equation 2, comparing each policy parameter's impact on uninsurance in the final year of available data for of each administration (all compared to the pre-ACA 2013 baseline). We also include the output for our coefficients of interest in Appendix I.

[Figure 2 about here.]

We see the most variation in the reach of the ACA subsidies across administrations. We find that the subsidies were most effective at reducing uninsurance in the Obama and Biden administrations, and less effective in the Trump administration. Between the Trump and Obama administrations, there is a

statistically significant drop in the effect of our ACA HIU percent subsidy measure on uninsurance. The coefficient representing the difference between the two measures across administrations is 0.012 (p< 0.000), which we call the "Trump effect" on the ACA percent subsidy measure. Overall, the subsidy coefficient was about 25 percent bigger in the Obama than Trump era.

Of course, it is possible that this is not a Trump effect, but rather a more general time effect; e.g., maybe individuals react less to subsidies after the law has been in place for a few years and the newness of the policy has worn off. But this would not explain why the effectiveness of the subsidies goes back up under the Biden Administration. The coefficient representing the difference on the ACA HIU percent subsidy measure between the Biden and Trump administrations is -0.014 ($p < 0.000$), which we identify as the "Biden effect" on the ACA HIU subsidy measure. Overall, the coefficients indicate a 32 percent larger reduction in uninsurance for the same ACA subsidy amounts under President Biden than under President Trump. Of course, we cannot rule out other time series reasons for this increase in subsidy take-up, such as individuals paying more attention to subsidies in the wake of the pandemic, but they coincide with the range of ACA-related outreach efforts described in Section 2.3 and the large surge in Marketplace enrollment evidence in administrative data during this period as well (CMS Newsroom 2025).

The effects of each presidential administration on the Medicaid policy measures are more mixed. The welcome mat effect between the Trump and Obama administrations, and between the Biden and Trump administrations, are not statistically different. Similarly, there is no difference between the newly-Medicaid eligible measure across the Trump and Obama administrations. There is, however, a marginally statistically significant difference between the newly-Medicaid eligible measures across the Biden and Trump administrations (β=-0.006, p< 0.071), reflecting a slightly larger coverage effect under Biden. This means that people who became *newly* eligible for Medicaid during the Biden administration — as compared to under the Trump administration — were more likely to gain coverage as a result of

the expansion in their state. Because Medicaid expansion decisions and coverage policies vary widely by state (unlike the ACA Marketplace subsidies), it is not surprising that the differences across presidential administrations is more modest than the Marketplace differences, and the changes in the Medicaid policy effects detected above are also more plausibly attributable to a number of state-level factors other than the presidential administration in office.[16]

4.4 Decomposing the ACA Uninsured Effects

Table 3 decomposes the overall uninsured effect from each policy change by year. The "Reduction in Uninsurance" column contains the same coefficients shown in Figure 2 – the effect of each policy parameter on uninsurance using equation 2. The second column ("Policy Mean") shows the average of the policy variable in every year, generated using actual HIU income. The second-to-last column ("Coverage Effect") shows the coefficient on the year-policy variable interaction term for the uninsured outcome, multiplied by the policy mean for that policy variable in each year. We then sum the absolute coverage effects across variables to calculate the total percentage-point drop in uninsurance explained by our policy variables in each year. The final column ("% ACA Coverage Effect") represents the share of the overall ACA-related reduction in uninsurance explained by policy component each year. Decomposing the policy effects in this way allows us to examine how much of each policy variable contributes to the overall coverage effect our variables are able to explain.

[Table 3 about here.]

Over 40 percent of the reduction in uninsurance explained by our policy variables is a result of the subsidies, a pattern that is consistent across administrations. The subsidies – including from the ACA and the ARP – explain 55 percent of the coverage effect in 2023. The remaining coverage effect in each year is split between the welcome mat effect and new Medicaid eligibility, with about two thirds of the

[16] For instance, several new states expanded Medicaid between 2019 and 2023. These states likely differ from the pre-2019 expansion states in the size of their uninsured populations, pre-expansion eligibility criteria, outreach efforts, and more, which could also drive different estimates of this coefficient across time periods.

Medicaid effect coming from new eligibility. Compared to prior research using 2014-2015 data, the 2023 findings reflect a larger role for Marketplace coverage and Medicaid expansion as the ACA has matured, and a smaller role for the welcome mat as a share of total enrollment gains (Frean, Gruber, and Sommers 2017).[17]

4.5 Effects by Coverage Type and Assessing Crowd-Out

Table 4 shows the results for equation 2 for additional coverage outcomes: in addition to percent uninsured, the table includes the percentages with Medicaid or non-group (which includes Marketplace) coverage and ESI as a function of our policy parameters across each administration. We also calculate the estimated ESI "crowd out," when relevant, based on the ratio of reductions (if any) in ESI to the gains in Medicaid / non-group coverage.

[Table 4 about here.]

The results (Column 2) indicate that each policy measure resulted in an increase in Medicaid/non-group coverage in 2016, 2019, and 2023. Notably, there is significant growth in the effect of each policy measure in between the Trump (2019) and Biden (2023) administrations in particular. The effect of the ACA percent subsidy measure on self-reported Medicaid/non-group coverage increases from 0.07 to 0.12 percentage points – just over a 70 percent increase – between the two administrations. If we convert the 2023 ACA percent subsidy coverage changes (β=0.12) to an elasticity, at the mean subsidy (15.5%) and baseline Medicaid/non-group coverage rate (26.9%), we calculate an estimate of -0.07, which is comparable to that in Frean et al. using 2014-2015 ACA data (-0.09).[18] The effect of the Medicaid newly eligible and pre-ACA eligible variables increase by over 30 percent between 2019 and 2023 as well.

[17] Frean, Gruber, and Sommers (2017) found that the Marketplace subsidies produced 40 percent of the coverage gains explained by the ACA policy variables, and Medicaid the other 60 percent (half of which occurred among those eligible for Medicaid prior to the ACA.

[18] Other work using administrative enrollment data for states relying on the federal platform between 2015-2017 found slightly more elastic demand for Marketplace coverage specifically (Hopkins, Banthin, and Minicozzi 2025).

To assess the rate of crowd-out of ESI, we divide the reductions in ESI by the increase in Medicaid/non-group coverage for each policy measure. We find that in 2016, there is only a small reduction in ESI in response to Marketplace subsidies, and if anything, an *increase* in response to Medicaid policies; overall, the degree of crowd-out from Marketplace subsidies is about nine percent. By 2019, subsidy crowd-out has grown to 30 percent, while there remains no evidence of Medicaid crowd out. In 2023, crowd-out due to the ACA subsidies remains at about 30 percent. But there is a larger crowd-out of nearly 50 percent for the additional ARP subsidies. This differential crowd-out effect between the ACA and ARP subsidies is likely due to the increased generosity of the ARP subsidies and could be partially attributed to the addressing of the family glitch described in Section 2.3.

4.6 Heterogeneity Across State Groups

We then evaluate the heterogeneity of the effect of each policy parameter across state groupings (SBM versus FFM) across time in Figure 3, with regression results shown in Table 5. We see that there are sizeable differences between these two state groups. For every policy variable in every year, the coefficient is larger in SBM states. That is, the coverage provisions of the ACA were uniformly more successful in states that were more focused on successful implementation.

[Figure 3 about here.]

Moreover, for Marketplace subsidies, differences across these groups of states is even larger than the differences across presidential administrations. The ACA subsidies had an effect in SBM states that was at least twice as large than in FFM states in every year. In other terms, the average percentage gap in effect sizes between FFM and SBM was approximately 50 percent; this is at least nearly two times the gap between the Trump and Biden or Obama administrations within either type of state.

[Table 5 about here.]

To ensure that our SBM versus FFM results are not just reflecting state heterogeneity – as opposed to something particular about this division – we run a permutation test in Appendix J. We

randomly group states into groups the same size as the 2023 SBM (19) and FFM (32) states, running the same models (shown in Appendix E.1) on the random SBM and FFM placebo groups 100 times. We find that as the share of the population in the SBM placebo groups approaches the true share of the population residing in a 2023 SBM state, the difference on the 2023 HIU percent subsidy measure between SBM and FFM gets larger and approaches the true difference we estimate (-0.04).

For the Medicaid policy variables, we also see stronger effects in SBM states, although the gaps are smaller. Interestingly, for the Medicaid expansions the gap between SBM and FFM is the states is the largest in the law's early years (2013-2016); it narrows in the law's later years. For the previously eligible, it is at least 18 percent larger across administrations.

There are also some interesting interactions between state type and time. For the ACA subsidies in SBM states, the effect sizes are indistinguishable from each other across all three administrations. But for the FFM states, differences in effectiveness were smaller between Obama and Trump, and largest under Biden. For both Medicaid measures, the patterns across the groups of states are similar in SBM states; the effect sizes are indistinguishable from each other across all three administrations. In FFM states, the effect of the newly-eligible measure rises between Obama and Trump and then remains unchanged between Trump and Biden. The welcome mat effect size, on the other hand, remains constant across administrations. This suggests that federal outreach and marketing may be more consequential for Marketplace enrollment than for Medicaid especially in states that rely on the federal platform, particularly for people already eligible for Medicaid before the ACA.

5. DISCUSSION & CONCLUSION

The ACA has proven to be a remarkably resilient law, both in terms of its politics and in its actual impact. However, this work shows that implementation – both in terms of federal and state oversight – can work to either enhance or stymie its reach.

We find that federal oversight matters particularly when it comes to the effectiveness of the Marketplace subsidies in reducing uninsurance. During their first term, the Trump Administration took a number of actions to undermine the ACA's reach through the Marketplaces. While the law still succeeded in getting more people covered, we find the Administration's actions did reduce the overall effectiveness of the subsidies, relative to how they fared during the Obama and Biden Administrations. We also show that state choices matter – the same subsidy goes further in states with their own SBM, as compared to states relying on the federal platform. While we are unable to attribute these differences to specific causes in this study, we can consider potential contributing factors here. First, states with their own SBM can make state-specific outreach and enrollment assistance choices that may lead to increased enrollment in Marketplace coverage. Second, states with SBMs generally have more pro-coverage environments than states that do not (e.g., all SBM states also have their own state-level mandate). Third, research has shown that there is differential take-up of Marketplace coverage across demographic groups, with larger enrollment among Democrats than Republicans – and the former are more concentrated in SBM states (Sances and Clinton 2019; Hero et al. 2021). This means that the varying effectiveness of the subsidies across SBM and FFM states could be in part a result of differential demographic and partisan distributions of populations in these states.

Our findings also suggest that the expiration of the ARP subsidies – which will occur at the end of this year without federal legislation – would likely have consequences for the insurance coverage of millions of people across the country. Our time series analysis shows that the overall decline in the uninsured rate under the ACA was 7.5 percentage points (from 17.4 in 2013 to 10.0 in 2023), reflecting roughly 20 million more people under age 65 with coverage in 2023. If we attribute 18.5 percent of these gains to the ARP subsidies, as indicated in Table 3, this would translate into roughly 3.7 million

people gaining coverage as a result. It is likely that most of them will lose this coverage if they end.[19] This compares to the 2.2 million people estimated by the Congressional Budget Office to lose coverage in 2026 in the absence of the ARP subsidies, and 3.7 million in 2027 (CBO 2024).

But our findings suggest that, even in the absence of legislative changes to the Marketplace and Medicaid, the new Administration could alter the trajectory of the law's impact, despite historic ACA-related gains over the past few years (Tolbert et al. 2025). Already in 2025, the Trump administration announced plans to slash navigator funding for the Marketplace by 90 percent (Goldman 2025), suggesting that the implementation differences we studied here are likely to play out again over the coming term. While the ACA's federalist structure has been key to its success – allowing for significant federal and state collaboration – it also makes the law more vulnerable to shifts in presidential administrations. Understanding this dynamic is essential for assessing the ACA's long-term effectiveness in expanding coverage.

[19] A more conservative estimate would come from taking the absolute coefficients in the third column of Table 3, and applying that to the population denominator of people under 65 (roughly 276 million). In that case, a -0.39% reduction in uninsurance would translate into roughly 1 million people. However, our model includes year fixed effects that capture some of the ACA time-series coverage gains, meaning this calculation is almost certainly an underestimate of the subsidies' impact.

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TABLES AND FIGURES

Table 1. Summary statistics of policy measures and time series change in insurance outcomes

	2013	2016	2019	2023
Policy Measures				
Medicaid eligibility				
Pre-ACA Medicaid eligible	23.0%	21.7%	19.9%	18.7%
Medicaid newly eligible	N/A	8.32%	8.03%	8.0%
Marketplace subsidies				
(1) Unsubsidized premium	N/A	$8,550	$13,435	$12,401
(2) ACA subsidy	N/A	$1,276	$2,470	$1,873
(3) Net premium after ACA subsidy [1 – 2]	N/A	$7,275	$10,965	$10,527
(4) ARP additional subsidy	N/A	N/A	N/A	$1,734
(5) Net premium after ARP subsidy [3 – 4]	N/A	N/A	N/A	$8,794
(6) ACA percent subsidy [2 / 1]	N/A	15.1%	18.5%	15.5%
(7) ARP added percent subsidy [((2 + 4) / 1)-6]	N/A	N/A	N/A	11.9%
Insurance Outcomes				
Uninsured	17.4%	10.7%	11.6%	10.0%
Medicaid and non-group coverage	26.9%	32.8%	30.4%	33.5%
Employer-sponsored insurance	56.3%	57.7%	59.1%	59.3%

Notes: Table contains weighted means of each policy measure and coverage outcome, for the population 0 to 64 years old. All measures are assessed at the HIU level and use ACS survey weights. The policy measure means were constructed using actual (not predicted) income.

Table 2. Uninsured results (equation 1), 2023 vs. 2013

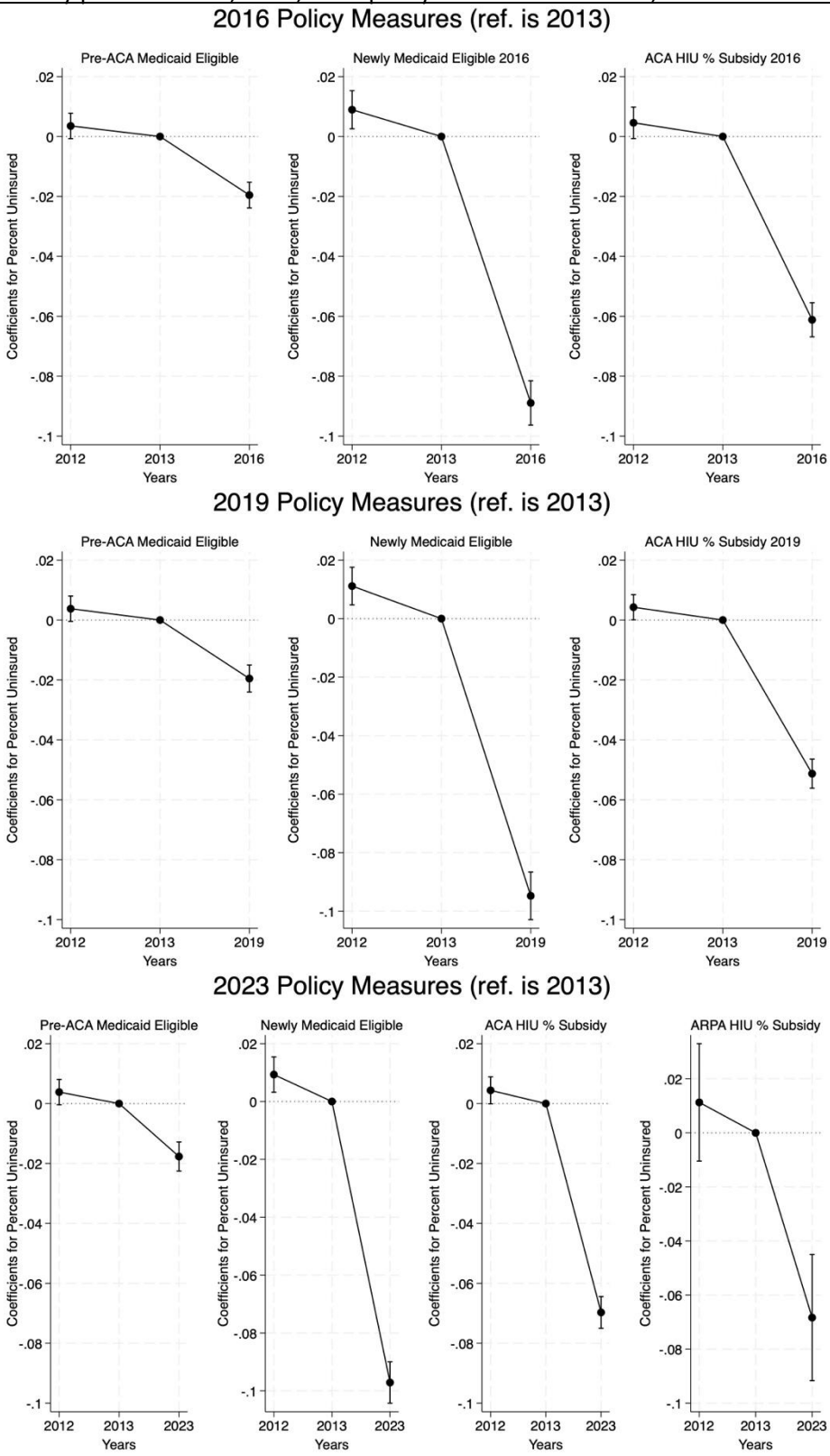
Policy Interactions	(1)	(2)	(3)
2023 * ACA HIU Percent Subsidy 2023	-0.0683***	-0.0753***	-0.0712***
	(0.00270)	(0.00299)	(0.00287)
2023 * ARP Added HIU Percent Subsidy 2023	-0.0676***	-0.0762***	-0.0726***
	(0.0120)	(0.0122)	(0.0121)
2023 * Medicaid Newly Eligible 2023	-0.0982***	-0.102***	-0.106***
	(0.00367)	(0.00428)	(0.00426)
2023 * Pre-ACA Medicaid Eligible	-0.0191***	-0.0345***	-0.0288***
	(0.00249)	(0.00306)	(0.00294)
Mandate in Effect	-0.0388***	-0.0387***	-0.0395***
	(0.00279)	(0.00278)	(0.00278)
Observations	2,070,101	101,892	181,404
Unit of Analysis	HIU	PUMA-Income-HIU Type	Age-PUMA-Income-HIU Type
HIU Type FE	yes	yes	yes
HIU Type * Income Band FE	yes	yes	yes
HIU Type * PUMA FE	yes	yes	yes
HIU Type * Year FE	yes	yes	yes
HIU Type * Age FE	no	no	yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

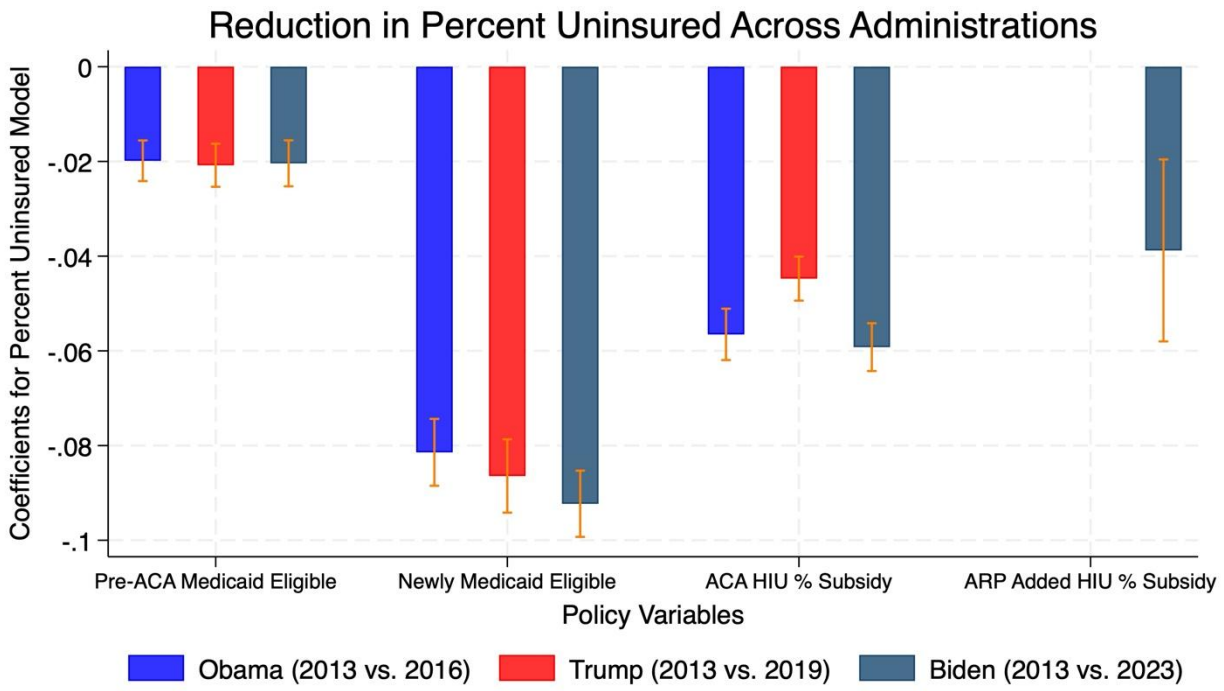
Each model includes demographic controls for the heads of household including race and ethnicity; age; education level; citizenship status; current employment status; and the number of kids in the household if applicable. Model 3 is collapsed at the same level as Model 2 and also by age - where at least one head of household is older than 45. All models use ACS survey weights. Robust standard errors are clustered at the PUMA level.

Figure 1. Event study plots for 2016, 2019, 2023 policy measures over time, uninsured outcome



Notes: Figure contains output for event study specifications for our primary policy measures of interest. Appendix D contains regression specifications for each model.

Figure 2. Uninsured results (eq. 2), 2016, 2019, 2023 vs. 2013



Notes: Figure shows coefficients for equation 2 for uninsured outcome. Model includes demographic controls for the heads of household including race and ethnicity; age; education level; citizenship status; current employment status; and the number of kids in the household if applicable. Model includes PUMA; survey year; income group; PUMA*HIU type; year*HIU type; and income group*HIU type fixed effects. Model uses ACS survey weights. Robust standard errors are clustered at the PUMA level. Orange bars represent 95% confidence interval for each coefficient. Output shown in Appendix I.

Table 3. Uninsured results (eq. 2), policy means, and % coverage effects (2016, 2019, 2023 vs. 2013)

Policy Interactions	Reduction in Uninsurance	Policy Mean	Absolute Coverage Effect (Implied percentage-point change)	**% ACA Coverage Effect**
2016 * ACA HIU Percent Subsidy	-0.0565***	0.151	-0.85%	43.5%
	(0.00277)			
2016 * Medicaid Newly Eligible	-0.0814***	0.083	-0.68%	34.5%
	(0.00360)			
2016 * Pre-ACA Medicaid Eligible	-0.0199***	0.217	-0.43%	22.0%
	(0.00219)			
			-1.96%	**100.0%**
2019 * ACA HIU Percent Subsidy	-0.0447***	0.185	-0.83%	42.7%
	(0.00237)			
2019 * Medicaid Newly Eligible	-0.0864***	0.080	-0.69%	35.9%
	(0.00394)			
2019 * Pre-ACA Medicaid Eligible	-0.0208***	0.199	-0.41%	21.4%
	(0.00232)			
			-1.93%	**100.0%**
2023 * ARP Added HIU Percent Subsidy	-0.0388***	0.119	-0.46%	18.5%
	(0.00980)			
2023 * ACA HIU Percent Subsidy	-0.0592***	0.155	-0.92%	36.7%
	(0.00257)			
2023 * Medicaid Newly Eligible	-0.0923***	0.080	-0.74%	29.5%
	(0.00357)			
2023 * Pre-ACA Medicaid Eligible	-0.0204***	0.187	-0.38%	15.3%
	(0.00247)			
			-2.50%	**100.0%**
Mandate in Effect	-0.0133***			
	(0.00146)			
Observations	4,097,469			

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Column 1 model includes demographic controls for the heads of household including race and ethnicity; age; education level; citizenship status; current employment status; and the number of kids in the HIU if applicable. Model includes PUMA; survey year; income group; PUMA*HIU type; year*HIU type; and income group*HIU type fixed effects. Model uses ACS survey weights. Robust standard errors are clustered at the PUMA level. "Policy Mean" shows the average of the policy variable in every year. "Coverage Effect" shows the coefficient on the year-policy variable interaction term for the uninsured outcome, multiplied by the policy mean for that policy variable in each year, calculated using HIU actual income. "% ACA Coverage Effect" represents the share of the overall ACA-related reduction in uninsurance explained by each policy component each year.

Table 4. Results for all coverage types (eq. 2) and crowd-out (2016, 2019, 2023 vs. 2013)

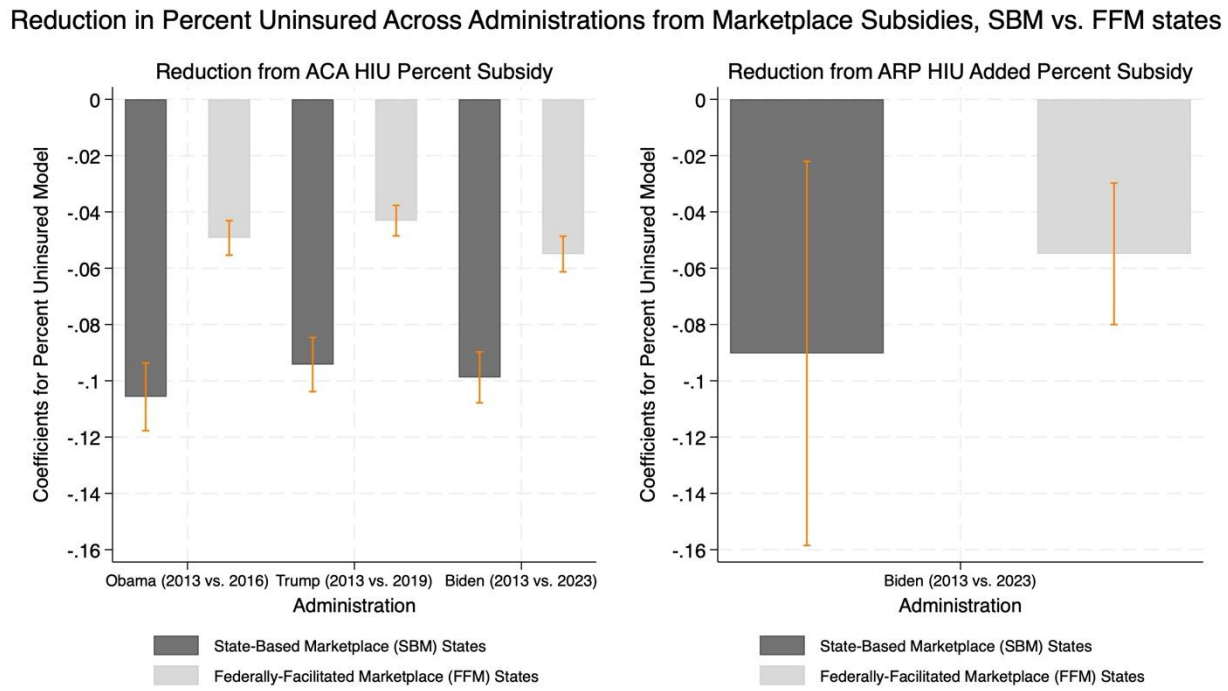
Policy Interactions	(1) Uninsured	(2) Medicaid/Non-group	(3) ESI	ACA + ARP Crowd Out
2016 * ACA HIU Percent Subsidy	-0.0565***	0.0675***	-0.00600*	8.89%
	(0.00277)	(0.00361)	(0.00338)	
2016 * Medicaid Newly Eligible	-0.0814***	0.0707***	0.0138***	N/A^
	(0.00360)	(0.00418)	(0.00372)	
2016 * Pre-ACA Medicaid Eligible	-0.0199***	0.0185***	0.00728**	N/A^
	(0.00219)	(0.00321)	(0.00292)	
2019 * ACA HIU Percent Subsidy	-0.0447***	0.0697***	-0.0211***	30%
	(0.00237)	(0.00327)	(0.00316)	
2019 * Medicaid Newly Eligible	-0.0864***	0.0875***	0.00724*	N/A^
	(0.00394)	(0.00431)	(0.00381)	
2019 * Pre-ACA Medicaid Eligible	-0.0208***	0.0199***	0.00864***	N/A^
	(0.00232)	(0.00368)	(0.00317)	
2023 * ARP Added HIU Percent Subsidy	-0.0388***	0.101***	-0.0394***	39.0%
	(0.00980)	(0.0143)	(0.0125)	
2023 * ACA HIU Percent Subsidy	-0.0592***	0.120***	-0.0366***	30.5%
	(0.00257)	(0.00369)	(0.00331)	
2023 * Medicaid Newly Eligible	-0.0923***	0.114***	-0.00359	N/A*
	(0.00357)	(0.00461)	(0.00396)	
2023 * Pre-ACA Medicaid Eligible	-0.0204***	0.0268***	0.00916***	N/A^
	(0.00247)	(0.00378)	(0.00323)	
Mandate in Effect	-0.0133***	0.0181***	-0.00354*	
	(0.00146)	(0.00248)	(0.00207)	
Observations		4,097,469		

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

^These values indicate negative crowd out. *These values are not statistically significant. Each model includes demographic controls for the heads of household including race and ethnicity; age; education level; citizenship status; current employment status; and the number of kids in the household if applicable. Models includes PUMA; survey year; income group; PUMA*HIU type; year*HIU type; and income group*HIU type fixed effects. Models use ACS survey weights. Robust standard errors are clustered at the PUMA level. "ACA + ARP Crowd Out" is calculated by dividing the reductions in ESI by the increases in subsidized coverage.

Figure 3. Uninsured results (2-yr models) by SBM vs. FFM states (2016, 2019, 2023 vs. 2013)



Notes: Figure shows coefficient from state group heterogeneity analysis (model specification details in Appendix E.1). Each model includes demographic controls for the heads of household including race and ethnicity; age; education level; citizenship status; current employment status; and the number of kids in the household if applicable. Models includes PUMA; survey year; income group; PUMA*HIU type; year*HIU type; and income group*HIU type fixed effects. Models use ACS survey weights. Robust standard errors are clustered at the PUMA level.

Table 5. Uninsured results (2-yr models) by SBM vs. FFM states (2016, 2019, 2023 vs. 2013)

	2013-2016	2013-2019	2013-2023
State Subgroups			
SBM States			
Year * ARPA Added Percent Subsidy			-0.0903***
			(0.0348)
Year * ACA HIU Percent Subsidy	-0.106***	-0.0942***	-0.0988***
	(0.00613)	(0.00490)	(0.00461)
Year * Newly Medicaid Eligible	-0.101***	-0.0968***	-0.106***
	(0.00568)	(0.00630)	(0.00487)
Year * Pre-ACA Medicaid Eligible	-0.0197***	-0.0229***	-0.0228***
	(0.00358)	(0.00365)	(0.00359)
Observations	631,419	657,658	861,349
FFM States			
Year * ARPA Added Percent Subsidy			-0.0549***
			(0.0128)
Year * ACA HIU Percent Subsidy	-0.0492***	-0.0431***	-0.0550***
	(0.00313)	(0.00276)	(0.00322)
Year * Newly Medicaid Eligible	-0.0748***	-0.0924***	-0.0931***
	(0.00483)	(0.00550)	(0.00557)
Year * Pre-ACA Medicaid Eligible	-0.0166***	-0.0165***	-0.0165***
	(0.00275)	(0.00296)	(0.00341)
Observations	1,382,830	1,369,737	1,208,752

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Each model includes demographic controls for the heads of household including race and ethnicity; age; education level; citizenship status; current employment status; and the number of kids in the household if applicable. Models includes PUMA; survey year; income group; PUMA*HIU type; year*HIU type; and income group*HIU type fixed effects. Models use ACS survey weights. Robust standard errors are clustered at the PUMA level.

APPENDIX

Appendix A. Details on PUMA inclusion and sensitivity analysis

A.1. Details on HIU PUMA inclusion

Prior to removing the HIUs in "changed" PUMAs from our final dataset (which contains HIU-level 2013, 2016, 2019, and 2023 ACS data), our dataset contained 5,701,637 HIUs (unweighted); after only keeping the HIUs in "unchanged" PUMAs, our final dataset contained 4,104,724 HIUs (unweighted). We are able to include 72.44% (weighted) of all HIUs in our analysis.

Weighted demographics for all HIUs compared to those in unchanged PUMAs				
	2013		2016	
	All	*Unchanged*	*All*	*Unchanged*
HIU_FamSize	2.69	2.70	2.67	2.69
Age_HoH1	32.31	32.32	32.24	32.28
Disabled_HoH1	6.63%	6.54%	6.65%	6.57%
Educ_HoH1	14.34	14.32	14.35	14.33
HoH1_RaceRec_White	71.04%	70.54%	70.18%	69.59%
HoH1_RaceRec_Black	9.39%	8.81%	9.26%	8.71%
HoH1_RaceRec_Asian	4.68%	4.84%	4.99%	5.13%
HoH1_RaceRec_Latino	13.89%	14.82%	14.57%	15.58%
HoH2_RaceRec_White	75.47%	74.89%	74.51%	73.92%
HoH2_RaceRec_Black	7.16%	6.80%	7.27%	6.88%
HoH2_RaceRec_Asian	3.99%	4.14%	4.29%	4.43%
HoH2_RaceRec_Latino	12.52%	13.35%	13.07%	13.95%
FPL_HIU_Pred	3.63	3.60	3.87	3.83
Observations	1,399,893	1,005,344	1,401,086	1,008,904
	2019		2023	
	All	*Unchanged*	*All*	*Unchanged*
HIU_FamSize	2.65	2.67	2.64	2.65
Age_HoH1	32.16	32.18	32.30	32.32
Disabled_HoH1	6.40%	6.33%	7.26%	7.23%
Educ_HoH1	14.38	14.36	14.51	14.49
HoH1_RaceRec_White	69.56%	68.99%	68.42%	67.80%
HoH1_RaceRec_Black	9.27%	8.74%	8.81%	8.35%
HoH1_RaceRec_Asian	5.19%	5.33%	5.57%	5.72%
HoH1_RaceRec_Latino	15.04%	16.02%	15.88%	16.80%
HoH2_RaceRec_White	73.67%	73.03%	72.52%	71.89%
HoH2_RaceRec_Black	7.40%	7.05%	7.19%	6.88%
HoH2_RaceRec_Asian	4.49%	4.61%	4.78%	4.94%
HoH2_RaceRec_Latino	13.61%	14.51%	14.34%	15.12%
FPL_HIU_Pred	4.17	4.13	4.36	4.32
Observations	1,423,161	1,025,717	1,477,494	1,064,757

A.2. HIU PUMA inclusion sensitivity analysis

We then run equation 2 on the full set of data (i.e., without dropping any PUMAs, Column 1) before the PUMAs were redrawn, using 2013, 2016, and 2019 data. We then compare these estimates to when we run our model on just the same years using the subset of our data that are included in our analyses (i.e., households in "unchanged PUMAs," Column 2), and we find that the results are quite similar. We include the output from both models below, for our policy interactions of interest and direct effects.

	(1)	(2)
VARIABLES	All HIUs	HIUs in unchanged PUMAs only
2019 * ACA HIU Percent Subsidy 2019	-0.0537***	-0.0543***
	(0.00222)	(0.00260)
2019 * Newly Medicaid Eligible 2019	-0.0846***	-0.0872***
	(0.00312)	(0.00365)
2019 * Pre-ACA Medicaid Eligible	-0.0317***	-0.0310***
	(0.00201)	(0.00239)
2016 * ACA HIU Percent Subsidy 2016	-0.0732***	-0.0738***
	(0.00269)	(0.00319)
2016 * Newly Medicaid Eligible 2016	-0.0819***	-0.0870***
	(0.00312)	(0.00359)
2016 * Pre-ACA Medicaid Eligible	-0.0304***	-0.0303***
	(0.00188)	(0.00224)
ACA HIU Percent Subsidy 2019	0.0290***	0.0203***
	(0.00452)	(0.00534)
ACA HIU Percent Subsidy 2016	-0.00805*	-0.000136
	(0.00436)	(0.00510)
Newly Medicaid Eligible 2019	0.0578***	0.0540***
	(0.00618)	(0.00722)
Newly Medicaid Eligible 2016	0.0255***	0.0306***
	(0.00480)	(0.00551)
Pre-ACA Medicaid Eligible	-0.0971***	-0.101***
	(0.00313)	(0.00384)
Mandate in Effect	-0.0135***	-0.0114***
	(0.00179)	(0.00250)
Observations	4,218,680	3,034,504

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Each model includes demographic controls for the heads of household including race and ethnicity; age; education level; citizenship status; current employment status; and the number of kids in the household if applicable. Each model includes PUMA; survey year; income group; PUMA*HIU type; year*HIU type; and income group*HIU type fixed effects. Each model uses ACS survey weights. Robust standard errors are clustered at the PUMA level.

Appendix B. Income prediction specification

We predict HIU family income for household i as a function of the following variables:

$$\begin{aligned}\widehat{HIU\_FamIncome\_Predicted_i} &= \beta_0 + \beta_1 N\_Children\_0_i + \beta_2 N\_Children\_1_i + \beta_3 N\_Children\_2_i \\ &+ \beta_4 N\_Children\_3_i + \beta_5 N\_Children\_4_i + \beta_6 N\_Children\_5Plus_i \\ &+ \beta_7 HoH1\_Age\_Under25_i + \beta_8 HoH2\_Age\_Under25_i + \beta_9 HoH1\_Age\_25\_34_i \\ &+ \beta_{10} HoH2\_Age\_25\_34_i + \beta_{11} HoH1\_Age\_35\_44_i + \beta_{12} HoH2\_Age\_35\_44_i \\ &+ \beta_{13} HoH1\_Age\_45\_54_i + \beta_{14} HoH2\_Age\_45\_54_i + \beta_{15} HoH1\_Age\_65Plus_i \\ &+ \beta_{16} HoH2\_Age\_65Plus_i + \beta_{17} HoH1\_RaceEth_i + \beta_{18} HoH2\_RaceEth_i \\ &+ \beta_{19} HoH1\_Educ_i + \beta_{20} HoH2\_Educ_i + \beta_{21} HoH1\_DisabilityStatus_i \\ &+ \beta_{22} HoH2\_DisabilityStatus_i + \beta_{23} HIU\_Type_i + \beta_{24} PUMA_i\end{aligned}$$

Where $N\_Children\_'\#'$ is a binary indicator representing whether HIU i has the corresponding number of children in their family. $HoH1\_Age\_'range'$ is a binary indicator representing whether one of the heads of the HIU is in the corresponding age range; $HoH2\_Age\_'range'$ is a binary indicator representing whether the other heads of the HIU is in the corresponding age range. $HoH1\_RaceEth$ is a categorical variable indicating whether one of the heads of the HIU is white, Black, Asian, Native American, or "other," as indicated on the ACS; $HoH2\_RaceEth$ is a categorical variable indicating whether the other head of the HIU is white, Black, Asian, Native American, or "other," as indicated on the ACS. $HoH1\_Educ$ is a categorical variable indicating whether one of the heads of the HIU has less than a high-school diploma, at least a high-school diploma, or graduated from college; $HoH2\_Educ$ is a categorical variable indicating whether the other head of the HIU has less than a high-school diploma, at least a high-school diploma, or graduated from college. $HoH1\_DisabilityStatus$ is a binary variable indicating whether one of the heads of the HIU has a disability; $HoH2\_DisabilityStatus$ is a binary variable indicating whether the other head of the HIU has a disability. $PUMA$ is a categorical variable indicating which PUMA the HIU resides in. HIU income was predicted using ACS survey weights and robust standard errors were clustered at the PUMA level.

Appendix C. ACA's Marketplace premium contribution requirements

The ACA's Marketplace premium contribution requirements vary slightly year to year. The law's premium contribution requirements for 2016, 2019, and 2023 – as well as the ARP's limits – are below. Because we want to decompose the effects of original ACA and new ARP subsidies on insurance separately, we use the ACA's 2021 premium contribution requirements (released before the passage of the ARP) to approximate what the ACA premium contribution ranges would have been in the post ARP years, had the more generous subsidies not been enacted.

ACA coverage year 2016

FPL cutoff	Premium contribution limit as a share of annual income
<133% FPL	2.03% maximum
133-<150% FPL	3.05-4.07%
150-<200% FPL	4.07-6.41%
200-<250% FPL	6.41-8.18%
250-<300% FPL	8.18-9.66%
300-400% FPL	9.66% maximum

Source: IRS, https://www.irs.gov/pub/irs-drop/rp-14-62.pdf

ACA coverage year 2019

FPL cutoff	Premium contribution limit as a share of annual income
<133% FPL	2.08% maximum
133-<150% FPL	3.11-4.15%
150-<200% FPL	4.15-6.54%
200-<250% FPL	6.54-8.36%
250-<300% FPL	8.36-9.86%
300-400% FPL	9.86% maximum

Source: IRS, https://www.irs.gov/pub/irs-drop/rp-18-34.pdf)

ACA overage year 2023 (using the 2021 ACA limits)

FPL cutoff	Premium contribution limit as a share of annual income
<133% FPL	2.07% maximum
133-<150% FPL	3.10-4.14%
150-<200% FPL	4.14-6.52%
200-<250% FPL	6.52-8.33%
250-<300% FPL	8.33-9.83%
300-400% FPL	9.83% maximum

Source: IRS, https://www.irs.gov/pub/irs-drop/rp-20-36.pdf

ARP coverage year 2023

FPL cutoff	Premium contribution limit as a share of annual income
<150% FPL	0.00% maximum
150-<200% FPL	0.00-2.00%
200-<250% FPL	2.00-4.00%
250-<300% FPL	4.00-6.00%
300-400% FPL	6.00-8.50%
400%+ FPL	8.50% maximum

Source: IRS, https://www.irs.gov/pub/irs-drop/rp-23-29.pdf

Appendix D. Event-study specifications

Specification for 2016 policy measures (output shown in top panel of Figure 1):

$$PctUninsured_{ipt} = \beta_0 + \beta_1 PreACA\_McaidElig_{ip} + \beta_2 McaidNewlyElig2016_{ip} + \beta_3 ACA\_PctSubsidy2016_{ip}$$
$$+ \beta_4(PreACA\_McaidElig_{ip} * 2012_t) + \beta_5(McaidNewlyElig2016_{ip} * 2012_t) + \beta_6(ACA\_PctSubsidy2016_{ip} * 2012_t)$$
$$+ \beta_7(PreACA\_McaidElig_{ip} * 2016_t) + \beta_8(McaidNewlyElig2016_{ip} * 2016_t) + \beta_9(ACA\_PctSubsidy2016_{ip} * 2016_t)$$
$$+ \beta_{10} Mandate + (\gamma_p * HIU\_Type_i) + (\delta_t * HIU\_Type_i) + (\lambda_i * HIU\_Type_i) + X_{ipt} + \epsilon_{ipt}$$

Specification for 2019 policy measures (output shown in middle panel of Figure 1):

$$PctUninsured_{ipt} = \beta_0 + \beta_1 PreACA\_McaidElig_{ip} + \beta_2 McaidNewlyElig2019_{ip} + \beta_3 ACA\_PctSubsidy2019_{ip}$$
$$+ \beta_4(PreACA\_McaidElig_{ip} * 2012_t) + \beta_5(McaidNewlyElig2019_{ip} * 2012_t) + \beta_6(ACA\_PctSubsidy2019_{ip} * 2012_t)$$
$$+ \beta_7(PreACA\_McaidElig_{ip} * 2019_t) + \beta_8(McaidNewlyElig2019_{ip} * 2019_t) + \beta_9(ACA\_PctSubsidy2019_{ip} * 2019_t)$$
$$+ \beta_{10} Mandate + (\gamma_p * HIU\_Type_i) + (\delta_t * HIU\_Type_i) + (\lambda_i * HIU\_Type_i) + X_{ipt} + \epsilon_{ipt}$$

Specification for 2023 policy measures (output shown in bottom panel of Figure 1):

$$PctUninsured_{ipt} = \beta_0 + \beta_1 PreACA\_McaidElig_{ip} + \beta_2 McaidNewlyElig2023_{ip} + \beta_3 ACA\_PctSubsidy2023_{ip} + \beta_4 ARP\_AddedPctSubsidy2023_{ip}$$
$$+ \beta_5(PreACA\_McaidElig_{ip} * 2012_t) + \beta_6(McaidNewlyElig2023_{ip} * 2012_t) + \beta_7(ACA\_PctSubsidy2023_{ip} * 2012_t) + \beta_8 ARP\_AddedPctSubsidy2023_{ip} * 2012_t)$$
$$+ \beta_9(PreACA\_McaidElig_{ip} * 2023_t) + \beta_{10}(McaidNewlyElig2023_{ip} * 2023_t) + \beta_{11}(ACA\_PctSubsidy2023_{ip} * 2023_t) + \beta_{12}(ARP\_AddedPctSubsidy2023_{ip} * 2023_t)$$
$$+ \beta_{13} Mandate + (\gamma_p * HIU\_Type_i) + (\delta_t * HIU\_Type_i) + (\lambda_i * HIU\_Type_i) + X_{ipt} + \epsilon_{ipt}$$

Appendix E. Details on state group heterogeneity (SBM vs. FFM state) model

Appendix E.1. SBM vs. FFM model specifications

To estimate the effects of our policy measures in SBM and FFM states, we ran the below models on each sets of states separately (i.e., the 2016 SBM model was ran twice – once on the 2016 SBM states listed on the following page, and again on the 2016 FFM states).

Specification for 2016 SBM model (results shown in Figure 3 and Table 5, Column 1):

$$PctUninsured_{ipt} = \beta_0 + \beta_1 PreACA\_McaidElig_{ip} + \beta_2 McaidNewlyElig2016_{ip} + \beta_3 ACA\_PctSubsidy2016_{ip}$$
$$+ \beta_4(PreACA\_McaidElig_{ip} * 2016_t) + \beta_5(McaidNewlyElig2016_{ip} * 2016_t) + \beta_6(ACA\_PctSubsidy2016_{ip} * 2016_t)$$
$$+ \beta_7 Mandate + (\gamma_p * HIU\_Type_i) + (\delta_t * HIU\_Type_i) + (\lambda_i * HIU\_Type_i) + X_{ipt} + \epsilon_{ipt}$$

Specification for 2019 SBM model (results shown in Figure 3 and Table 5, Column 2):

$$PctUninsured_{ipt} = \beta_0 + \beta_1 PreACA\_McaidElig_{ip} + \beta_2 McaidNewlyElig2019_{ip} + \beta_3 ACA\_PctSubsidy2019_{ip}$$
$$+ \beta_4(PreACA\_McaidElig_{ip} * 2019_t) + \beta_5(McaidNewlyElig2019_{ip} * 2019_t) + \beta_6(ACA\_PctSubsidy2019_{ip} * 2019_t)$$
$$+ \beta_7 Mandate + (\gamma_p * HIU\_Type_i) + (\delta_t * HIU\_Type_i) + (\lambda_i * HIU\_Type_i) + X_{ipt} + \epsilon_{ipt}$$

Specification for 2023 SBM model (results shown in Figure 3 and Table 5, Column 3):

$$PctUninsured_{ipt} = \beta_0 + \beta_1 PreACA\_McaidElig_{ip} + \beta_2 McaidNewlyElig2023_{ip} + \beta_3 ACA\_PctSubsidy_{ip}$$
$$+\beta_4 ARP\_AddedPctSubsidy2023_{ip}$$
$$+ \beta_5(PreACA\_McaidElig_{ip} * 2023_t) + \beta_6(McaidNewlyElig2023_{ip} * 2023_t) + \beta_7(ACA\_PctSubsidy2023_{ip} * 2023_t)$$
$$+ \beta_8(ARP\_AddedPctSubsidy2023_{ip} * 2023_t)$$
$$+ \beta_9 Mandate + (\gamma_p * HIU\_Type_i) + (\delta_t * HIU\_Type_i) + (\lambda_i * HIU\_Type_i) + X_{ipt} + \epsilon_{ipt}$$

Appendix E.2. SBM and FFM states, by year

MARKETPLACE TYPE	2016	2019	2023
State-Based Marketplace	California, Colorado, Connecticut, DC, Idaho, Kentucky, Maryland, Mass, Minnesota, NY, RI, Washington	**Arkansas**, California, Colorado, Connecticut, DC, Idaho, Maryland, Mass, Minnesota, **NM**, NY, **Oregon**, RI, Washington	Calfornia, Colorado, Connecticut, DC, Idaho, **Kentucky**, **Maine**, Maryland, Mass, Minnesota, **NJ** NM, NY, **Nevada,** Oregon, **Pennsylvania**, RI, Washington
Federally-Facilitated Marketplace	Alabama, Alaska, Arizona, Arkansas, Delaware, Florida, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Michigan, Mississippi, Missouri, Montana, NC, ND, NH, NJ, NM, Nebraska, Nevada, Ohio, Oklahoma, Oregon, Pennsylvania, SD, Tenn, Texas, Utah, Virginia, WV, Wisconsin, Wyoming	Alabama, Alaska, Arizona, Delaware, Florida, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, **Kentucky**, Louisiana, Maine, Michigan, Mississippi, Missouri, Montana, NC, ND, NH, NJ, Nebraska, Nevada, Ohio, Oklahoma, Pennsylvania, SD, Tenn, Texas, Utah, Virginia, WV, Wisconsin, Wyoming	Alabama, Alaska, Arizona, **Arkansas**, Delaware, Florida, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Mississippi, Missouri, Montana, NC, ND, NH, Nebraska, Ohio, Oklahoma, SD, Tenn, Texas, Utah, Virginia, WV, Wisconsin, Wyoming

States in **bold** switched between Marketplace type during our study period.

We counted a state as an SBM state only if it fully ran its own Marketplace, as indicated by CMS (https://www.cms.gov/marketplace/resources/data/state-based-public-use-files). States that have a state-based Marketplace but rely on the federal platform were categorized as FFM states.

Appendix F. Equation 1 uninsured outcome results with direct effects (corresponds to main text Table 2, Column 1)

VARIABLES	(1)
2023 * ARP Added HIU Percent Subsidy 2023	-0.0676***
	(0.0120)
2023 * ACA HIU Percent Subsidy 2023	-0.0683***
	(0.00270)
2023 * Newly Medicaid Eligible 2023	-0.0982***
	(0.00367)
2023 * Pre-ACA Medicaid Eligible	-0.0191***
	(0.00249)
ARP Added HIU Percent Subsidy 2023	0.0204**
	(0.00858)
ACA HIU Percent Subsidy 2023	0.0313***
	(0.00299)
Newly Medicaid Eligible 2023	0.0140***
	(0.00395)
Pre-ACA Medicaid Eligible	-0.108***
	(0.00356)
Mandate in Effect	-0.0388***
	(0.00279)
Observations	2,070,101

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Model includes demographic controls for the heads of household including race and ethnicity; age; education level; citizenship status; current employment status; and the number of kids in the household if applicable Model includes PUMA; survey year; income group; PUMA*HIU type; year*HIU type; and income group*HIU type fixed effects. Model uses ACS survey weights. Robust standard errors are clustered at the PUMA level.

Appendix G. Equation 1 uninsured outcome with HIU-level state-specific mandate penalty amounts

VARIABLES	(1)	(2)
2023 * ARP Added HIU Percent Subsidy 2023	-0.0619***	-0.0747***
	(0.0119)	(0.0120)
2023 * ACA HIU Percent Subsidy 2023	-0.0656***	-0.0680***
	(0.00267)	(0.00276)
2023 * Newly Medicaid Eligible 2023	-0.0940***	-0.101***
	(0.00368)	(0.00377)
2023 * Pre-ACA Medicaid Eligible	-0.0149***	-0.0208***
	(0.00252)	(0.00248)
HIU Mandate Penalty (in $100s)	1.10e-05***	-2.97e-06***
	(1.12e-06)	(6.47e-07)
Mandate in Effect	-0.0653***	
	(0.00490)	
Observations	2,070,101	2,070,101

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

"HIU Mandate Penalty" is modeled for Massachusetts in 2013, and Massachusetts, California, Connecticut, DC, and Rhode Island in 2023. Model includes demographic controls for the heads of household including race and ethnicity; age; education level; citizenship status; current employment status; and the number of kids in the household if applicable. Model includes PUMA; survey year; income group; PUMA*HIU type; year*HIU type; and income group*HIU type fixed effects. Model uses ACS survey weights. Robust standard errors are clustered at the PUMA level.

Appendix H: Equation 1 uninsured outcome, limited to only immediate and never Medicaid expanders

VARIABLES	(1)
2023 * ARP Added HIU Percent Subsidy 2023	-0.0889***
	(0.0123)
2023 * ACA HIU Percent Subsidy 2023	-0.0879***
	(0.00332)
2023 * Newly Medicaid Eligible 2023	-0.101***
	(0.00376)
2023 * Pre-ACA Medicaid Eligible	-0.0263***
	(0.00284)
Mandate in Effect	-0.0378***
	(0.00284)
Observations	1,456,257

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Model only includes states that immediately expanded Medicaid in 2014 - Arizona, Arkansas, California, Colorado, Connecticut, DC, Delaware, Hawaii, Illinois, Iowa, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, North Dakota, New Jersey, New Mexico, New York, Nevada, Ohio, Oregon, Rhode Island, Vermont, West Virginia, and Washington; and those that still had not expanded by 2023 - Alabama, Florida, Georgia, Kansas, Mississippi, North Carolina, South Carolina, Tennessee, Texas, Wisconsin, and Wyoming. Model includes demographic controls for the heads of household including race and ethnicity; age; education level; citizenship status; current employment status; and the number of kids in the household if applicable. Model includes PUMA; survey year; income group; PUMA*HIU type; year*HIU type; and income group*HIU type fixed effects. Model uses ACS survey weights. Robust standard errors are clustered at the PUMA level.

Appendix I. Equation 2 uninsured outcome results (corresponds to main text Figure 2)

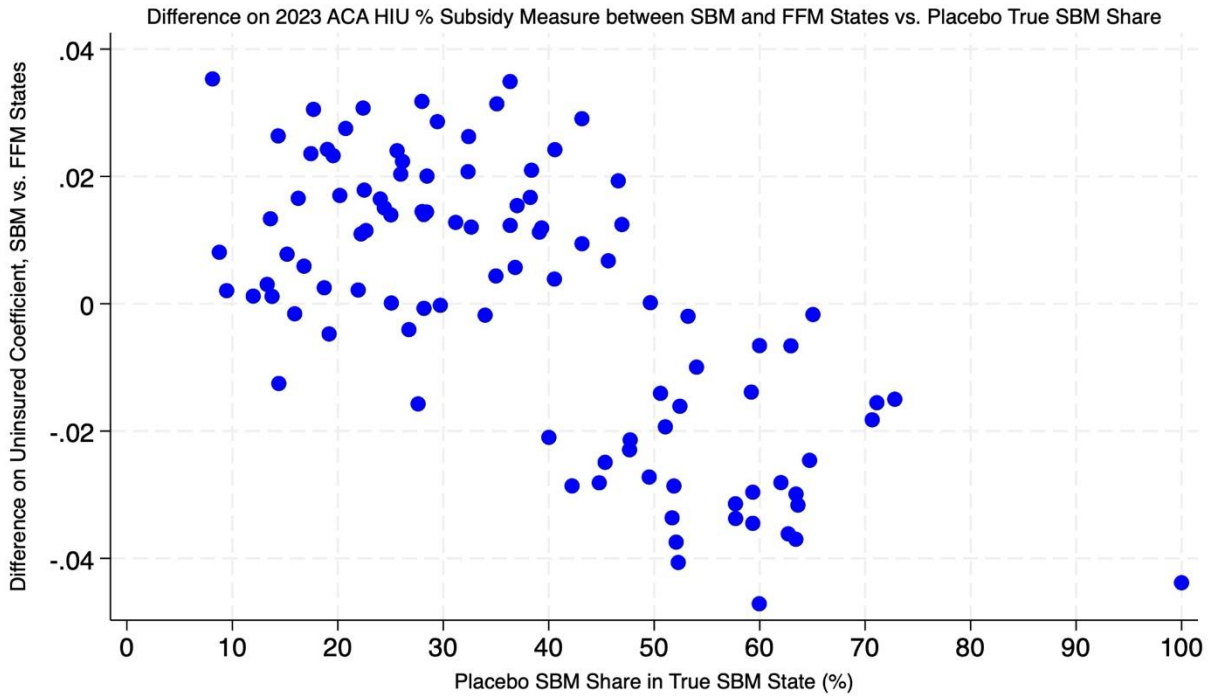
VARIABLES	(1)
2023 * ARP Added HIU Percent Subsidy 2023	-0.0388***
	(0.00980)
2023 * ACA HIU Percent Subsidy 2023	-0.0592***
	(0.00257)
2023 * Newly Medicaid Eligible 2023	-0.0923***
	(0.00357)
2023 * Pre-ACA Medicaid Eligible	-0.0204***
	(0.00247)
2019 * ACA HIU Percent Subsidy 2019	-0.0447***
	(0.00237)
2019 * Newly Medicaid Eligible 2019	-0.0864***
	(0.00394)
2019 * Pre-ACA Medicaid Eligible	-0.0208***
	(0.00232)
2016 * ACA HIU Percent Subsidy 2016	-0.0565***
	(0.00277)
2016 * Newly Medicaid Eligible 2016	-0.0814***
	(0.00360)
2016 * Pre-ACA Medicaid Eligible	-0.0199***
	(0.00219)
Mandate in Effect	-0.0133***
	(0.00146)
Observations	4,097,469

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Model includes demographic controls for the heads of household including race and ethnicity; age; education level; citizenship status; current employment status; and the number of kids in the household if applicable. Model includes PUMA; survey year; income group; PUMA*HIU type; year*HIU type; and income group*HIU type fixed effects. Model uses ACS survey weights. Robust standard errors are clustered at the PUMA level.

Appendix J: Results from SBM vs. FFM placebo permutation test



Notes: Figure shows results from permutation test, where we randomly group states into the same size as the 2023 SBM (19) and FFM (32) states, running the 2023 SBM vs FFM model specifications (Appendix E.1) 100 times on the pairings. The x-axis represents the share of the population in each placebo SBM group that actually lives in an SBM state; the y-axis represents the difference between the SBM and FFM results for our uninsured outcome. The plot thus represents the differential effect between the two groups of states against the share of the placebo SBM that are SBM states, where our non-random selection is 100% SBM.