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ABSTRACT

One way to measure the efficiency of the Affordable Care Act (ACA) is the extent to which gains in publicly supported health insurance reduced uninsured rates. Using data from the 2008–2024 American Community Survey, we examine time trends in rates of uninsured, public insurance coverage, and employer-sponsored insurance (ESI) by groups defined by the ratio of income to the Federal Poverty Line (FPL). We obtain estimates of associations between changes in public coverage and changes in uninsured and ESI exploiting state-by-year variation in ACA implementation. Importantly, we estimate the total effect of the ACA—including both the Medicaid expansion and Marketplace coverage—on uninsured and ESI rates. For adults in households below 150% of the federal poverty level (FPL), increases in public insurance coverage were associated with one-for-one decrease in uninsured and no change in ESI. For adults with incomes between 151%–400% FPL, each percentage point increase in public coverage was associated with about a 0.6 percentage point decrease in uninsured and a 0.4 decrease, or crowd out, in ESI. Crowd-out was larger among groups with higher pre-ACA ESI rates such as parents and married adults. Using variation from the Medicaid expansion alone to evaluate the ACA's effect on ESI leads to overstating crowd-out among low-income adults (below 150% FPL) and understating crowd-out among higher-income adults (above 250% FPL). Our findings suggest that policies intended to subsidize health insurance of higher income groups, for example, the enhanced premium subsidies, are far less efficient than policies intended to further expand public insurance to low-income groups, for example, in non-expansion states.

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Introduction

A decade has passed since the ACA facilitated the expansion of Medicaid to childless adults and established a Marketplace offering access to publicly subsidized nongroup plans. According to the Center on Budget and Policy Priorities, these two features of the ACA have increased the number of people covered by publicly supported health insurance (i.e., Medicaid or Marketplace plans) by 40 million and decreased the number of people without insurance by 19 million (Center on Budget and Policy Priorities 2024). As implied by these figures, there was not a one-to-one tradeoff between the number of people with government supported health insurance coverage and the number of people uninsured. The tradeoff seems closer to two-to-one than one-for-one and suggests there was significant movement between other forms of insurance, for example, employer-sponsored insurance (ESI) and publicly supported insurance.[1] These figures also highlight the potential inefficiency of the ACA in reducing the number of uninsured because it implies that the government had to support two people for every one person who became newly insured.

While the existence of the inefficiency just described is known, how that inefficiency differs by income and over time, is not well documented. In this article, we provide evidence of this missing information. We describe the relationship between changes in the proportion of non-elderly adults with publicly supported health insurance (Medicaid or Marketplace), the proportion who are uninsured, and the proportion with employer-sponsored insurance. We describe how these relationships change over time and across states. In doing so, we identify the efficiency of two major components of the ACA in reducing uninsured rates and how that efficiency has changed over time. The evidence we provide highlights what were the most efficient features of the ACA and points the way to potential policy changes that can improve that efficiency.

[1] A similar two-for-one tradeoff is implied by figures published by KFF: https://www.kff.org/affordable-care-act/health-policy-101-the-affordable-care-act/?entry=table-of-contents-what-did-the-aca-change-about-health-coverage-in-the-u-s

Figure 1 provides some preliminary evidence of what we refer to as the efficiency of the ACA. The figure shows changes in the proportion of adults ages 19-64 with public health insurance coverage and changes in the proportion who are uninsured between 2008 and 2024 for four groups of people defined by the ratio of family income to the federal poverty line. We set 2013 as the reference year. We also show the difference in the changes in coverage, specifically, the change in public coverage minus the change in uninsured. For those with household incomes that are less than or equal to 150 percent of the federal poverty level (FPL), there is virtually a one-to-one association between the proportion of people with publicly supported insurance and the proportion uninsured. The two lines track very closely over time and the difference in the changes between public coverage and uninsured is roughly zero throughout the period implying that all those gaining public coverage came from those who were previously uninsured. The implication is that for this low-income group, the ACA provisions were remarkably efficient.

For those with household incomes between 151 and 250 percent of the FPL, the association between the proportion of people with publicly supported insurance and the proportion uninsured is positive but clearly less than a one-to-one. There is also a noticeable change in the association around 2019. After 2019, increases in public insurance coverage are largely unrelated to changes in uninsured rates. By 2024, there had been more than a 15-percentage point increase in the share of the group with publicly supported insurance but only about a 10-percentage point decline in the proportion uninsured. For higher income groups, the association between the proportion of people with publicly supported insurance and the proportion uninsured weakens further. For those with incomes between 251 and 400 percent of the FPL, there was approximately a 10-percentage point increase between 2013 and 2024 in the proportion with publicly provided insurance and only a 5-percentage point decrease in the proportion uninsured. Finally, for those with incomes between 400 and 500 percent of the there was a relatively small increase in the share with publicly supported insurance (a 5-6 pp increase) but an even smaller decrease in the proportion uninsured (about 3 pp), suggesting again an inefficiency in the ACA's ability to reduce rates of uninsurance.

The data presented in Figure 1 are consistent with the evidence from the Center on Budget and Policy Priorities on the efficiency of the ACA and highlights how the efficiency of the ACA differs by income group and time. The ACA decreased uninsured the most among the lowest income group and had an increasingly smaller impact on the proportion uninsured as income increases. There was also a noticeable decrease in the efficiency of the ACA after 2021 when enhanced tax credits were implemented and Medicaid eligibility rules were altered (but later reversed).

This study expands upon the simple analysis represented in Figure 1 in several ways. First, we separate publicly supported insurance into Medicaid and Marketplace insurance and track changes over time and by income group in both. We similarly track changes in ESI. Second, we present these trends separately by states, at first grouping states by whether they expanded Medicaid, but also across all states. Third, we obtain regression-based estimates of the association between changes in public insurance (i.e., Medicaid or Marketplace) and uninsured rates and between public insurance and ESI (referred to as "crowd-out"). Below, we elaborate on the regression analysis and its interpretation but note here that this approach exploits variations in the ACA and its consequences across all states. Estimates from the regressions calibrate the efficiency of the ACA in terms of how well it has reduced the number of uninsured and affected ESI.

An important contribution of our research is its focus on the ACA and not just the Medicaid expansion. Most of the extant literature examined differences in insurance outcomes between states that did and did not expand Medicaid (e.g., Kaestner et al. 2017; Gruber and Sommers 2019; Soni, Wherry, and Simon 2020; Lennon 2025). The few studies that assessed the wider impact of ACA coverage provisions (e.g., Courtemanche et al. 2017; Frean, Gruber, and Sommers 2017) examined periods of time soon after ACA implementation in 2014. A more comprehensive assessment, as we do, includes the full association with the ACA across all states, for example, including the increase in publicly supported insurance coverage in non-expansion states ("woodwork" effects) and the substitution of coverage between Medicaid and Marketplace. Finally, we assess heterogeneous effects of the ACA by demographic groups that had different pre-ACA ESI coverage.

Estimates from regression analyses indicate that increases in public insurance coverage were associated with decreases in uninsured rates. For the lowest income group (<150% FPL), the association was one-to-one with each one percentage point increase in public coverage associated with a one percentage point decrease in uninsured rate. That efficiency metric between public insurance and uninsured declined with income. For groups with incomes between 151% and 500% of FPL, each one percentage point increase in public coverage was associated with approximately a 0.6 percentage point decrease in uninsured rate, and a 0.4 percentage point decrease in ESI. That implies that the government paid for approximately 1.67 people for each newly insured person.

Results also indicate that the inefficiency of the ACA was significantly larger for groups that had higher pre-ACA rates of ESI coverage: parents, married people, and older people. The estimated extent of crowd out—substituting public insurance for ESI—was significantly larger for parents than childless adults, for married people than unmarried people, and for older (ages 45-64) than younger people. For parents and married people with incomes between 250-500% FPL, estimates indicate that the government supported approximately three people for each newly insured person—a very inefficient tradeoff.

The value of our more comprehensive analysis of the ACA can be illustrated by comparing it with a recent analysis of the effect of just the Medicaid expansions by Lennon (2025). Lennon (2025) reported an ESI-crowd out estimate of approximately 25 percent among households with incomes below 138 percent FPL. Our analysis shows that, when evaluating the ACA in full, estimates of ESI-crowd out are much smaller (5-10 percent) among the low-income population. We also show that this pattern reverses at higher income levels: among those with incomes above 250 percent FPL, analysis using just variation from Medicaid expansion generates smaller estimates of ESI crowd-out than estimates encompassing the entirety of the ACA's coverage provisions. Thus, prior studies focusing on Medicaid expansion do not adequately inform on the efficiency of the ACA and will determine lower-than-actual efficiency for low-income households and greater-than-actual efficiency for higher-income households.

Our findings suggest that the most efficient way to further reduce rates of uninsured is to focus on low-income groups, for example, implementing policies that provide subsidized coverage to low-income groups in non-expansion states. Results also suggest that eliminating or greatly reducing subsidies for higher-income groups would be an effective way to fund such a policy, as the subsidies to some groups, for example, parents with incomes above 250% of FPL, are highly inefficient and produce relatively small reductions in uninsured rates. In addition, the greater generosity of the public options, which motivates the switch from ESI, engenders greater amounts of moral hazard and inefficient use of healthcare services.

Data

We used data from the 2008-2024 American Community Survey (ACS) (Ruggles et al. 2024). The ACS is an annual survey administered by the U.S. Census Bureau that collects demographic, social, economic, and housing information from approximately 3.5 million households each year. The 2008 survey was the first year that information on health insurance coverage was collected. We restricted our analytic sample to non-elderly adults ages 19 to 64. Each respondent is assigned to a single coverage category using the following hierarchical classification: uninsured, ESI, Medicaid, Marketplace or other coverage (Medicare, TRICARE, VA/HIS). We additionally establish a combined Medicaid-or-marketplace indicator that we refer to as "public coverage." Individuals with Medicare, TRICARE, VA, or IHS coverage are retained in the denominator of all coverage rates.[2]

We classified individuals into four income categories based on self-reported family income relative to the FPL: 0–150 percent FPL, 151–250 percent FPL, 251–400 percent FPL, and 401–500 percent FPL. These thresholds roughly correspond to key ACA eligibility thresholds: 138 percent FPL is the upper limit for Medicaid eligibility in expansion states, 250 percent FPL marks the threshold for cost-sharing reductions in marketplace plans, and 400 percent FPL was the upper limit for premium tax credit eligibility prior to the American Rescue Plan Act of 2021. Stratifying analyses by income aligns with ACA changes, for example, Medicaid expansion (i.e., those below 150 percent FPL), and the Marketplace

[2] Fielding of the 2020 ACS was greatly disrupted by the COVID-19 pandemic (U.S. Census Bureau 2021). The Census Bureau subsequently released the 2020 ACS with "experimental weights" to address significant nonresponse bias (Rothbaum 2021). Our paper includes the 2020 ACS, but we have also assessed how each of the main analyses differs when 2020 is excluded. Dropping the 2020 survey year has virtually no effect on results.

subsidies but not Medicaid (i.e., approximately those between 151 and 400 percent FPL in expansion states; 100-400 percent FPL in non-expansion states), and those above traditional subsidy thresholds (i.e., those between 401 and 500 percent FPL).[3] We aggregated the individual data to the state-by-year-by-income-category level and calculated the mean of each insurance coverage within each cell using person weights from the ACS. This yielded 4,335 state-by-year-by-income-category cells.

Our focus is on state variation in the implementation of the ACA and heterogeneous effects of the ACA across states, for example, because of different state contexts with respect to rates of uninsured. However, we start by looking at variation in effects of ACA across expansion and non-expansion states. We used two definitions of Medicaid expansion. The first defines Medicaid expansion using the state-specific year that the state expanded Medicaid under the ACA as documented by the Kaiser Family Foundation (Kaiser Family Foundation 2024). Under this definition, a state is classified as an expansion state in its actual expansion year: for example, Indiana, and Pennsylvania in 2015, Alaska and Montana in 2016, Louisiana in 2017, Virginia and Maine in 2019, Idaho and Utah in 2020, Nebraska in 2021, Missouri and Oklahoma in 2022, and North Carolina and South Dakota in 2024.[4] Our second definition of whether a state expanded Medicaid is whether a state ever expanded Medicaid in 2014 or any year after (i.e., whether a state "ever expanded" Medicaid). Later-expanding states are grouped with 2014-expansion states rather than control states, as if they had adopted Medicaid expansion at the 2014 implementation date. Perhaps surprisingly, the different definitions do not make any qualitative difference on estimates or conclusions, and this is because we focus on the total effect of the ACA and not just the differences between states that expanded or not.

[3] We recognize that self-reported income from the ACS and other surveys is measured with error, particularly for lower-income households (Meyer and Mittag 2019). As a result, there are some individuals reporting income above 138% FPL who may in fact be Medicaid eligible as well as others reporting income below 138% FPL who are not.
[4] For states that implemented Medicaid expansion after 2014, we included the implementation year as the expansion year if the implementation month was between January-June. If expansion was implemented later in the calendar year, the following calendar year was defined as the first year of expansion.

Graphical Analysis

We begin the investigation of the efficiency of the ACA with a series of graphical analyses. In these analyses, we plot changes between 2008 and 2024 in the proportion of the sample with Medicaid coverage or Marketplace coverage, employer-sponsored coverage and who were uninsured. We use 2013, which is the year prior to the implementation of the ACA in 2014, as the reference year and all changes are measured relative to that year. We show changes by whether a state expanded Medicaid or not and by income group. For these figures we present trends using the "ever expanded" definition of Medicaid which displays coverage trends for all expansion states regardless of when individual states implemented expansion.

Figure 2 presents the graphs using the combined Medicaid and Marketplace measure to represent publicly supported insurance coverage. Appendix Figure 1 displays the same set of graphs but separates Medicaid and Marketplace coverage. There are several notable features of the graphs. First, in all four panels, changes in insurance coverage between 2008 and 2013 are small, for example, never larger than two to three percentage points, and an order of magnitude smaller than changes in 2014 and beyond. This finding shows that there were no marked trends in insurance coverage during this period for either expansion or non-expansion states or by type of insurance. This is an interesting finding considering the substantial attention that has been given to assessing parallel trends in more formal analyses of the effects of the ACA and to dating the expansion of Medicaid (Courtemanche et al. 2017; Kaestner et al. 2017; Simon, Soni, and Cawley 2017). While some of the changes in insurance coverage between 2008 and 2013 are statistically significant (we show this below), the smallness of these changes vis-à-vis the 2014 change and changes post-2014 suggest that a simple before-and-after analysis of the impact of the ACA on insurance coverage is useful and informative of the true impact of the ACA, although with possibility of a small bias. The value of the before-and-after approach is that it measures the full impact of the ACA, which contrasts with much of the research on this topic that has focused on the effect of the Medicaid expansion alone and the relative difference between expansion and non-expansion states. As Figures 1 and 2 indicate, that approach misses much of the impact of the ACA, for example, the increase in public coverage in non-expansion states.

Second, there is clear evidence in Figure 2 of a weakening of the association between changes in public coverage and changes in uninsured as income increases. This statement applies to both expansion and non-expansion states. Third, there is also a weakening of the association between changes in Medicaid coverage and changes in Marketplace coverage and changes in uninsured with respect to calendar time. In all panels of Figure 2, there is clearly a shift around 2021 in the association between changes in public coverage and changes in uninsured. This temporal variation roughly corresponds with changes in Medicaid eligibility requirements under the public health emergency (established in March 2020) and changes in the generosity of tax credits in the Marketplace (established under the American Rescue Plan Act in April 2021). One implication of these findings is that the retightening of Medicaid eligibility and failure to extend the enhanced tax credits may have less of an impact on the proportion uninsured because of the implied movements between coverage type instead of between coverage and uninsured.

Fourth, results in Appendix Figure 1 show that there was a significant amount of substitution between coverage through Medicaid and coverage through the Marketplace, particularly among the two lowest income groups. Marketplace coverage increased more in non-expansion states than expansion states, and this relative increase helped reduce the gap between expansion and non-expansion states in the change in uninsured. Among the lowest income group, there was also a relative increase in employer-sponsored insurance among people in non-expansion states versus expansion states that helped reduce the gap in uninsured. And in all panels of Figure 2, changes in employer-sponsored insurance were always less negative in non-expansion states than expansion states.

Finally, for those with incomes above 150 percent of FPL, there is evidence of a decline in ESI coverage that corresponds to increases in public insurance coverage. This pattern is most pronounced among those with incomes between 250 percent and 400 percent of the FPL. While the percentage-point changes in ESI (and other types of coverages) are relatively small for this income group, it is important to note that the density of people with ESI in these income categories is high and small percentage point changes represent many people.

Overall, data in Figure 2 suggest that the ACA resulted in a significant decrease in uninsured in both expansion and non-expansion states. Both the expansion of Medicaid and creation of the marketplace contributed to this decline, although Medicaid had a larger impact (as seen in Appendix Figure 1). However, as suggested by the evidence from the Center on Budget and Policy Priorities, KFF, and Figures 1 and 2, it seems that there was a significant inefficiency associated with achieving this outcome. Among those with incomes between 150 percent and 400 percent of the poverty line, the data suggest that it required government support for between 1.5 and 2 people to make one less person uninsured. The results also suggest that the inefficiency increased noticeably after 2021 and increased with income.

We next present results from a regression analysis that calibrates the likely inefficiency more precisely than possible with the graphical analysis.

Regression Analysis

The regression analyses are motivated by a conceptual model that views the changes in Medicaid and changes in Marketplace insurance as exogenous changes in policy. While this is a strong, and likely not completely valid, assumption, it allows us to obtain estimates that, if the assumption was valid, would be the association between expanding public insurance and uninsured and ESI. We recognize that changes in the economy over time across all states and among states, as well as changes in personal circumstances influence health insurance coverage. However, as the data in Figures 1 and 2 indicate, prior to 2014 and the implementation of the ACA, there were relatively small changes in insurance coverage and relatively little difference in changes in insurance coverage between states that did and did not expand Medicaid. These results suggest that a simple before-and-after regression analysis would yield estimates that are substantially informative of the impact of the ACA, if not exactly the causal effect. This approach also allows for an assessment of the impact of both the Medicaid expansion and creation of the Marketplace on insurance status and includes effects that many prior studies, particularly those exploiting the state variation in the expanding Medicaid miss such as the well documented woodwork effect (Frean, Gruber, and Sommers 2017; McMorrow and Kenney 2021). To be clear, we are not claiming that our approach estimates causal effects, but we do think that the estimates we obtain are not too far away from this gold standard and provide information that is unavailable from the typical differences-in-differences approach focusing on effects of Medicaid expansion.

Under the assumption that the expansion of Medicaid and the creation of the Marketplace are exogenous drivers of changes in health insurance coverage, we adopt an instrumental variables approach to measure how changes in Medicaid and changes in Marketplace coverage affected the proportion uninsured and proportion with employer-sponsored insurance (ESI). We instrument for Medicaid insurance and Marketplace insurance using the timing of the adoption of the ACA and subsequent changes in Medicaid eligibility (e.g., changes in re-certification) and the Marketplace (e.g., enhanced tax credits) and whether a state expanded Medicaid or not.

To clarify the approach, we describe the procedure as it is applied to estimating the association between public insurance coverage (Medicaid or Marketplace) on the proportion who are uninsured. The regression model for proportion uninsured is:

$$(1)\ Uninsured_{st} = a_0 + \alpha_1 \widehat{Public}_{st} + \theta_s + \sum_{k=t-1}^{t+1} \gamma_k\, UE_{s(k)} + \varepsilon_{st}$$

In (1), we include state indicators (θ_s) and include the one-year lead, one-year lag, and contemporaneous state unemployment rate (UE) to help address the influence of macroeconomic effects on both public coverage enrollment and uninsured rates.[5]

Under the assumptions described above, we instrument for the proportion with public coverage using interactions between time periods and whether or not a state expanded Medicaid. Algebraically, the model is:

$$(2)\ \widehat{Public}_{st} = \beta_0 + \beta_1(P_t^{08-10}) + \beta_2(P_t^{14-20}) + \beta_3(P_t^{21-24}) + \beta_4(E_s \times P_t^{08-10}) + \beta_5(E_s \times P_t^{14-20}) + \beta_6(E_s \times P_t^{21-24}) + \theta_s + \sum_{k=t-1}^{t+1} \gamma_k\, UE_{s(k)} + \mu_{st}$$

[5] Annual state unemployment data was collected from the Bureau of Labor Statistics' Local Area Unemployment Statistics.

In equation (2), there are four calendar period indicators: 2008–2010, 2014–2020, and 2021–2024 (with 2011–2013 as the omitted reference period). The years 2008 to 2013 are prior to the implementation of the ACA and we divided this period into two to measure trends in insurance coverage between 2008-2010 and 2011-2013 and whether those trends differed by Medicaid expansion status. The variable E_s is an indicator for states that ever-expanded Medicaid, and, as just noted, we include an interaction between that indicator and the calendar period indicators to measure pre- and post-2014 trends and differences in those trends by expansion status.

Using the language of instrumental variables and causal inference while acknowledging that we are not claiming to estimate a causal effect per se, the exclusion restriction in this case is the omission of the period fixed effects and interactions between those period fixed effects and the indicator for whether a state expanded Medicaid. Consider a case in which there are no pre-trends ($\beta_1 = 0, \beta_4 = 0$, and $\beta_1 + \beta_4 = 0$). In that case, the exclusion of the pre-2014 terms is valid. We report these estimates below but note here that approximately half of the estimates of these associations are not statistically significant and very small, and the other half, while statistically significant, are small, particularly relative to the post-2014 effects. We have already demonstrated this in Figure 2. So, while we cannot claim that excluding these terms (i.e., exclusion restriction) is strictly valid, evidence from Figure 2 and estimates reported below pertaining to pre-trends (β_1, β_4) suggest that the bias from doing so is quite small. For example, with respect to uninsured, only one out of eight estimates related to assessing pre-trends and reported below are statistically significant and all are less than half a percentage point. For Medicaid, estimates reported below indicate that among those with incomes below 250 percent FPL, there was a slightly lower proportion (1 to 2 percentage points) of people covered by Medicaid in 2008-2010 than in 2011-2013. These relatively small changes in Medicaid coverage over this period occurred during what was a tumultuous time spanning the Great Recession and its recovery, as well as some state level changes in Medicaid eligibility prior to the ACA. Unemployment was at its highest in 2010-11 and, which explains the slight increase in Medicaid during this period. Based on the evidence in Figure 2 and the evidence we report below related to pre-trends, we view the exclusion of the pre-2014 terms from equation (1) to be a reasonable approach, but below we do test models with and without indicators for these pre-2014 years.

The post-2014 terms in equation (2) are also omitted from equation (1), which assumes that there were no post-2014 confounding influences of the changes in the proportion uninsured (i.e., that changes in public insurance coverage are the sole influence). We cannot directly assess the likely validity of this assumption as we can for the pre-2014 terms. Basically, this is the assumption of the before-and-after approach we take. This approach yields estimates close to the true causal estimate if the changes in public insurance are the dominant cause of changes in uninsured. Consider a likely confounder, the macro economy. To address this possibility, we include the lag, contemporaneous and lead of state unemployment in the regression model. Is there likely more confounding? We already discussed that the Great Recession and its aftermath had relatively little association with insurance coverage vis-à-vis the pre-to-post 2014 changes in insurance. That is powerful evidence supporting the assumption underlying the omission of post-2014 terms from equation (1) conditionally on inclusion of unemployment rate. The unemployment rate varied from around six percent to three percent between 2014 and 2019; spiked to 8 percent in 2020; and then returned to three to four percent between 2022 and 2024. It is likely that these changes in unemployment affected health insurance coverage, but except for the COVID-19 spike, prior evidence and the evidence we present (e.g., Figure 2) suggests that the macro economy (unemployment), while an important cause of health insurance coverage, is unable to account for more than a small fraction of the observed changes in insurance coverage post-2014 (Holahan 2011; Cawley, Moriya, and Simon 2015; Benitez 2022; Gangopadhyaya and Garrett 2020). So, again, we think the exclusion of the post-2014 terms from equation (1), while technically not valid in the causal inference sense, are unlikely to bias estimates to an extent that would change the conclusions we reach.

In practice, we used three sets of instruments (i.e., versions of equation 2). The first instrument set uses expansion-state-by-period interactions (i.e., the same regressors from the event study specification). The second instrument set uses expansion-state-by-year interactions (i.e., one instrument for each year except the omitted reference year, 2013). The third instrument set uses state-by-year interactions. This final set of instruments exploits all the variation in the ACA and its consequences across all states.

Changes in Public Insurance Coverage 2008-2024: First Stage Estimates

Table 1 reports estimates of equation (2), or using the language of instrumental variables, first stage estimates, evaluating how Medicaid and privately purchased insurance coverage changed before and after ACA implementation. In Table 2, we combine Medicaid and Marketplace coverage into a single measure that we refer to as publicly supported insurance coverage[6], providing a comprehensive view of ACA-related coverage gains.

Pre-period (2008-2010) estimates are generally small, though not uniformly zero. Relative to the 2011-2013 reference period, all estimates are negative reflecting the slightly lower use of public insurance coverage in the 2008-2010. However, ranging from -0.2 to -1.1 percentage points across income groups, most pre-period coefficients are economically negligible relative to the post-2014 estimates. For the 0–150% FPL group, combined Medicaid-Marketplace coverage increased by 11.0 percentage points in expansion states during 2014–2020 and 14.8 percentage points during 2021–2024. In non-expansion states, gains were also substantial—4.6 and 7.4 percentage points in the same periods. This comparison underscores that non-expansion states achieved meaningful coverage gains through the Marketplace alone, though the gap with expansion states—roughly 7 percentage points in both periods—likely reflects the additional reach of Medicaid expansion.

For those with household income between 151-250 percent of FPL, coverage gains for publicly supported insurance coverage were similarly large after ACA implementation as the lowest group. In non-expansion states increases in public coverage were 4.3 and 7.1 percentage points in the 2014-2020 and 2021-2024 periods and qualitatively similar to the lowest income group. In expansion states these estimates are 8.8 and 12.4 percentage points, which are smaller than the lowest income group.

[6] Prior to 2014, privately purchased insurance coverage was not publicly supported anywhere except in Massachusetts. Across all years, including pre-ACA years, we refer to "publicly-supported insurance coverage" as people with either Medicaid coverage or privately purchased insurance coverage.

Nonetheless, publicly supported insurance coverage gains in all post-ACA periods are positive and very large in magnitude relative to pre-ACA periods. Even for households with incomes between 401-500% FPL, by 2021-2024, publicly supported insurance coverage increased by 2.2 and 4.2 percentage points in non-expansion and expansion states, respectively.

In Appendix Tables 1 and 2 we separate the combined Medicaid-Marketplace measure and assess how the ACA affected each coverage outcome. In contrast to the other coverage outcomes, pre-period Medicaid estimates are negative and statistically significant across all income groups in both expansion and non-expansion states. These negative pre-period estimates likely reflect the fact that the 2011–2013 reference period captured elevated Medicaid enrollment driven by the Great Recession. Medicaid functions as an automatic stabilizer during economic downturns (Holahan 2011), and enrollment rose sharply in the recession's aftermath. By comparison, the 2008–2010 period—before the full effects of the recession on Medicaid take-up had materialized—shows lower relative enrollment. The negative pre-period coefficients thus reflect this cyclical pattern rather than a violation of the research design.

Appendix Table 1 shows that, as expected, Medicaid gains are concentrated in expansion states. Non-expansion states also experienced Medicaid gains, albeit smaller in magnitude, likely reflecting woodwork effects whereby the ACA's outreach efforts brought previously eligible but unenrolled individuals into coverage (Frean, Gruber, and Sommers 2017). Notably, significant Medicaid gains extend to higher-income groups and strengthen in the later 2021-2024 period. These gains persist even though most individuals in these income groups should not qualify for Medicaid based on income alone. To the extent that income is volatile and measured with error in household surveys, some fraction of these gains may reflect transitory dips below eligibility thresholds rather than systematic misreporting.

Appendix Table 2 shows that non-expansion states experienced particularly large gains in Marketplace enrollment, reflecting the central role that the Marketplace plays in expanding coverage where Medicaid was not expanded. In expansion states, Marketplace gains for this group were more modest as Medicaid served as the primary coverage vehicle.

In Table 2, we estimate the "reduced-form" model of how the ACA's coverage provisions affected uninsured rates. Pre-period estimates (i.e., changes from 2008–2010 relative to the omitted 2011–2013 reference period) are economically small across most income groups. For example, the 2008–2010 coefficient for the 0–150% FPL group in non-expansion states is 0.3 percentage points, and the corresponding expansion state estimate is similarly modest (1.1 percentage points). For all remaining income groups and across both expansion and non-expansion states, 2008-2010 uninsured rates were small and statistically insignificant relative to the 2011-2013 reference period, which supports the plausibility of the research design.

After ACA implementation, uninsured rates fell dramatically for low-income households relative to the 2011–2013 reference period. For the 0–150% FPL group, the ACA was associated with 6.2 and 7.9 percentage point declines in uninsured rates in non-expansion states during the 2014–2020 and 2021–2024 periods, respectively. In expansion states, these reductions were larger, reaching 11.0 and 14.0 percentage points during the same periods. The coverage gains are striking in absolute terms. Predictably, the magnitude of reductions in uninsured rates falls for higher-income groups. In non-expansion states during the 2021–2024 period, uninsured rates fell by 4.9 percentage points for the 151–250% FPL population, 0.9 percentage points for the 251–400% FPL group, and 0.7 percentage points for the 401–500% FPL group. In expansion states, the declines in uninsured rates were larger in magnitude for each income group, but the change in the uninsured rate by each income group was similar across both groups of states.

We report changes in ESI coverage rates by each state group in Table 3. Pre-period estimates (2008–2010) across both groups of states are positive, small in magnitude, and statistically significant for lower- and middle-income groups: 0.7-0.8 percentage points for the 0–150% FPL group, 1.1-1.5 percentage points for the 151–250% FPL group, and 0.9-1.3 percentage points for the 251–400% FPL group. Although these pre-period differences are statistically detectable—particularly among lower-income expansion state groups—these associations are economically modest compared with the post-2014 treatment associations and do not suggest meaningful differential pre-trends in ESI. For the lowest-income group (0–150% FPL), non-expansion states experienced a notable increase in ESI rates during 2014–2020 of 1.5 percentage points. This is consistent with crowd-in: as the ACA's coverage provisions expanded awareness and facilitated access, some low-income individuals in non-expansion states may have gained ESI through employer mandate effects or the improving post-recession labor market.

The ESI story shifts for higher-income groups, particularly in the 2021–2024 period. For both state groups, among the highest income group (401-500% FPL), ESI rates declined by 3.0-3.5. Among the 251–400% FPL group, ESI rates declined by 3.7 percentage points in non-expansion states and 3.8 percentage points in expansion states during 2021–2024. For the 151–250% FPL group, the 2021–2024 period shows a 2.9 percentage point decline in expansion states, whereas the decline in non-expansion states is smaller (1.6 percentage points). These patterns are consistent with enhanced Marketplace subsidies under ARPA drawing individuals away from employer-sponsored coverage—a displacement that extends well beyond the income range directly affected by Medicaid expansion. To the extent that these ESI declines are concentrated in the post-2021 period and span both expansion and non-expansion states, they suggest that the primary driver of ESI displacement at higher incomes is Marketplace subsidy generosity rather than Medicaid eligibility.

Instrumental Variables Estimates of the Association between Public Insurance and Uninsured and ESI

Table 4 presents instrumental variables (IV) estimates that exploit variation in combined Medicaid-Marketplace coverage to quantify the associations between public coverage expansion and uninsured rates and ESI. We use three sets of instruments: 1) instrument for public coverage using period (2008-2010, 2011-2013, 2014-2020, 2021-2024) by state expansion group interactions; 2) using individual year and state-expansion group interactions; and 3) using state-by-year interactions. It is worth noting that models that use period-by-expansion status and year-by-expansion status, such as all prior studies that exploit only the Medicaid expansions of the ACA, are restricted versions of the model that uses state-by-year. The state-by-year model allows the association with the ACA to differ by every state, which is reasonable as the state-specific implementation differed and, more importantly, the state environment differed for example by baseline rates of uninsured, ESI, unemployment, poverty and complementary state policies. Exploiting all of this variation is useful, although it comes at the expense of potential violations of the exclusion restrictions (parallel trends).

In Table 4, IV estimates using what we refer to as the before-and-after approach and found in columns indicating that year effects were not included in the outcome equation (and are therefore instruments), indicate that a 1-percentage point increase in combined public coverage reduced the uninsured rate by 0.93 percentage points and has virtually no meaningful association with ESI among those with income between 0 and 150 percent of FPL. In other words, among the lowest-income group, virtually all of the increase in public coverage comes from the previously uninsured. IV estimates using the before-and-after approach for other income groups reveal a substantial gradient. As income rises, the association between public coverage and uninsured declines. A 1-percentage point increase in combined public coverage is associated with: about a 0.7-percentage point decline in uninsured for those with incomes of 151-250 percent of FPL, a 0.5 percentage point decline in uninsured for those with incomes of 251-400 percent of FPL, and a 0.3 percentage point decline in uninsured rates for those with incomes 401-500 percent of FPL . A similar income gradient is observed for the association between public coverage and ESI. A 1-percentage point increase in combined public coverage is associated with: about a 0.3 percentage point decline in ESI for those with incomes of 151-250 percent of FPL, and about a 0.5 percentage point decline in ESI for those with incomes of 251-400 percent of FPL, and a 0.6-0.7 percentage point decline in ESI for those with incomes between 401-500% FPL.

In sum, IV estimates in Table 4 using the before-and-after approach indicate that expansion of public insurance is increasingly less efficient as income rises. We illustrate this conclusion in Figure 3. For the lowest income groups there is approximately a 1-to-1 relationship between increase in public coverage and decreases in uninsured (Figure 3, left panel). This tradeoff declines to about 1.5-to-1 for those with incomes above 250 percent of FPL. The inefficiency stems from the switching from ESI to public insurance (Figure 3, right panel) that leads to no newly insured person but just a change in the payer and, perhaps, the affordability and generosity of insurance.

We also obtain IV estimates based on only the variation due to Medicaid expansion. For these estimates, we include year effects (as indicated in Table 4) and exploit only the variation in Medicaid due to whether a state expanded Medicaid and not the effect of the full ACA. These estimates indicate that a 1-percentage point increase in Medicaid coverage reduced the rate of uninsured by: 0.8-percentage points for those with incomes of 0-150 percent of FPL, and approximately 0.5-0.7 percentage points for those with incomes of 151-400 percent of FPL. Estimates related to the group with incomes between 401-500 percent of FPL are quite variable and reflect the fact that this group is largely unaffected by the ACA including the Medicaid expansions.

For ESI, IV estimates from models that exploit only Medicaid expansions suggest somewhat more substitution from ESI to Medicaid than the IV estimates incorporating the full ACA associations (under our assumptions). A 1-percentage point increase in Medicaid coverage reduced the share with ESI by: about 0.2-percentage points for those with incomes of 0-150 percent of FPL and 0.4-0.5 percentage points for those with incomes of 151-400 percent of FPL Again, estimates related to the group with incomes between 401-500 percent of FPL are unstable for the same reason as noted earlier.

An interesting result in Table 4 is that among lower income groups (<250% FPL), the ACA broadly considered was more efficient than the Medicaid expansions at reducing uninsured rate. This is evidenced by the fact that the estimates from models that exploit only the Medicaid expansions are smaller (less negative) than estimates from models that exploit the full implementation of the ACA. However, among higher income groups, estimates from models that exploit only the Medicaid expansions are larger (more negative) than estimates from models that exploit the full implementation of the ACA suggesting the Medicaid expansions were less efficient. The explanation for this is that crowd-out of ESI was greater among low-income households and lower among high-income households in states that expanded Medicaid. Moreover, exploiting just variation in Medicaid expansion results in much lower estimates of ESI crowd-out for high-income households (i.e. roughly 50-70 percent crowd-out vs 20-30 percent crowd-out). Thus, among higher-income households, the bulk of the estimated ESI crowd-out in the full ACA analysis can be attributed to effects from Marketplace coverage, which would have been missed in an analysis of expansion vs non-expansion states.

In the appendix, we show that the findings in Table 4 are robust to using the alternate definition of Medicaid expansion that uses the date of expansion (Appendix Table 3) rather than our simple “ever expanded” definition. Estimates in Table 4 and Appendix Table 3 differ little, even for estimates that include year indicators in the outcome equation and exploit just variation due to Medicaid expansion. This is remarkable given the coarse approach we use in our main, “ever expanded” definition of Medicaid expansion, which better facilitates trends analysis.

Overall, IV estimates in Table 4, whether from the models we refer to as the before-and-after approach or the more standard models that exploit only the Medicaid expansions, suggest a similar narrative. The expansion of public insurance was most strongly associated with reductions in the rate of uninsured for those with lower incomes. At higher levels of income, expansion of public insurance was associated with a combination of decreased uninsured and decreased ESI—what has become known as crowd out. The rate of crowd out is quite high at around 30-40 percent for those with incomes between 151-400 percent of FPL. The slightly larger estimates of crowd out from models that exploit only the Medicaid expansions suggest that the substitution of ESI for Medicaid was greater than the substitution of ESI for Marketplace insurance. Inspection of Tables 1 and 3 further illustrate this and reveal that the expansion of Medicaid was particularly large in expansion states, particularly, in the 2021-2024 period and these increases coincide with decreases in ESI.

Heterogeneity by pre-ACA ESI Enrollment

Next, we present estimates of the association between publicly supported insurance and uninsured and ESI for groups stratified by pre-ACA ESI coverage. Specifically, we examine the association between publicly supported insurance and uninsured and ESI by whether a person is a parent (presence of a child<18), whether they are married and by age (19-44 and 45-64). Each of these characteristics are correlated with the probability of having ESI prior to the ACA, as shown in Appendix Table 4. For those in households with income less than 150 percent of FPL, differences in ESI coverage are small and below

25 percent for all samples. Among higher income groups, however, differences in pre-ACA ESI coverage emerge. Among those with incomes between 151-500 percent FPL, parents are about 11-13 percentage points more likely to have ESI than non-parents and married adults are about 11-13 percentage points more likely to have ESI than non-married adults. Interestingly, differences in pre-ACA ESI coverage rates by age are not markedly different within any income group. Our hypothesis is that the ACA will be less efficient at reducing the rate of uninsured for groups with relatively high pre-ACA ESI. We expect greater crowd out among these groups. Appendix Table 4 also presents these pre-ACA ESI coverage estimates separately by Medicaid expansion group. Note that for *every* income-by-subgroup cell (i.e. across all 24 subgroup comparisons), pre-ACA ESI coverage was higher in expansion states compared to non-expansion states.

Table 5 presents the IV estimates of the association between public insurance coverage and uninsured and ESI coverage. We use the model that instruments for public coverage (again, combined Medicaid and Marketplace coverage) using period indicators and interactions of period indicators with state expansion group and excluding year indicators in the outcome regression (i.e., the "before and after" comparison). Figure 4 additionally provides a visual assessment of these IV estimates.

Consistent patterns emerge in this analysis. First, across all income groups, non-parents, non-married individuals, and younger adults consistently have larger sized associations with uninsurance declines and smaller associations with ESI coverage. At low levels of household income, the differences in these estimates by each stratification are small and then increasingly widen with income. For example, among those with incomes below 150%, a 1 pp increase in public coverage is associated with a 0.8 percentage point decline in uninsured rates among parents and a 0.9 percentage point decline in uninsured rates among non-parents. The impact estimate on uninsured rate drops precipitously for parents at higher income groups, falling to -0.3 percentage points for parents with 251-400 percent FPL and to -0.2 for parents with household incomes above 400-500 percent FPL. Crowd-out associations with ESI correspondingly *increase* for parents by income group. This does not occur to the same degree for non-parents, with uninsured rates declining to -0.7 and -0.6 percentage points for the two highest income groups. As a result, the *difference* in the efficiency of the ACA in reducing uninsured widens across parental status as income increases. And, with higher household income, the estimated crowd-out estimates strengthen for parents relative to non-parents.

For married individuals with incomes below 150 percent of FPL, a 1 percentage point increase in public coverage is associated with a -0.8 percentage point decline in uninsured rates and about a -0.2 percentage point decline in ESI coverage. These associations change markedly with income, with declines in uninsurance falling to -0.3 and -0.2 and ESI crowd-out associations rising in magnitude percentage points to -0.7 and -0.9 for the two highest income groups. On the other hand, for non-married individuals, the ACA is remarkably efficient across income groups. Expansions in public insurance coverage are associated with a -0.93 percentage point reduction in uninsured rates for the lowest income group and -0.89 for the highest income group. The corresponding ESI crowd-out estimates are small across all income groups for non-married individuals. Again, this suggests that for samples with greater pre-ACA ESI coverage rates (parents or married adults), and therefore with likely greater access to ESI in the post-ACA period, the ACA is increasingly inefficient with income and public insurance coverage gains are more likely coming from those who previously had ESI.

Despite having little estimated difference in ESI coverage at baseline by income group, there are strikingly different crowd-out estimates by age group in our analysis. For both younger (ages 19-44) and older (45-64) samples we continue to show that there is a clear inverse relationship between income and ACA efficiency, but this gradient is much steeper for older aged adults. For those under age 44, a 1 percentage point increase in public coverage is associated with a nearly one-for-one reduction in uninsured rates for the lowest income group (incomes below 150 percent of FPL) and a 0.6 percentage point decrease in the highest income groups (incomes above 250 percent of FPL). For adults ages 45-64, a 1 percentage point increase in public coverage lowers uninsured rates by -0.8 percentage points for the lowest income group and falls starkly to -0.3 percentage points for the highest income group. As a result, estimates of ESI crowd outreach -0.6 to -0.8 percentage points for these older aged adults in the highest income group.

Conclusion

The ACA dramatically expanded publicly supported insurance coverage across all states. In expansion states, Medicaid take-up rates were large, while individually purchased Marketplace coverage increased by a smaller magnitude. In non-expansion states, the overall effect of the ACA was smaller than in Medicaid expansion states, but gains in Marketplace coverage were substantial and reductions in uninsured rates relative to pre-ACA levels were large. We note that most studies of the ACA focus strictly on the differential effects in expansion versus non-expansion states; by doing so, they do not estimate the total effect of the ACA, including the effects of considerable coverage gains that accrued in non-expansion states.

Using analysis of trends in public coverage, uninsured rates, and ESI coverage, as well as an instrumental variables analysis that exploits variation in ACA implementation across states and income groups, we document a clear income gradient in the efficiency of the ACA's coverage provisions. For low-income groups (i.e., those with incomes below 150 percent FPL), the ACA was highly efficient: we estimate near one-to-one relationships between public insurance coverage gains and reductions in uninsured rates, and estimated ESI crowd-out for these groups are small. As income rises, however, the ACA becomes markedly less efficient, with public insurance coverage gains associated with smaller reductions in uninsured rates and larger estimated rates of ESI crowd-out.

These patterns are robust across multiple empirical approaches. Subgroup analyses further demonstrate that the ACA is less efficient for populations with higher pre-ACA ESI coverage rates, including parents and married adults — for each of these groups, ESI crowd-out estimates rise sharply with income. And we show that for younger adults the ACA coverage provisions remain relatively efficient across income groups, whereas for older adults estimates of ESI crowd-out rise steadily with income.

Our findings are consistent with Lennon (2025), a recent study assessing effects of Medicaid expansion on private/ESI. Lennon (2025) used data from 2009 to 2019 and reported difference-in-differences estimates indicating that, among those with incomes below 138% FPL, Medicaid expansion increased Medicaid coverage by 10.7 percentage points and reduced ESI coverage by 2.7 percentage points. These estimates imply about a 25% crowd-out rate. This is qualitatively similar to our approximate estimate of 20% crowd-out of ESI for the lowest-income group when exploiting variation induced by *just* Medicaid expansion alone (final 3 columns of Table 4). However, when considering the full ACA and its impact (first 3 columns of Table 4), our estimates of crowd out are virtually zero among the lowest income group.

It is worth considering why these two approaches yield distinct results. Analyses using just variation in Medicaid expansion to estimate ESI crowd-out reflects variation mostly among newly Medicaid eligible populations (i.e., predominantly low-income non-parents). Our assessment using the variation in public coverage from both the Medicaid expansions and Marketplace reflects changes in all affected populations in both expansion and non-expansion states (i.e. low-income non-parents, previously eligible adults, and those gaining Marketplace coverage). The implication from our analysis is that the affected populations of the total ACA effect exhibited less ESI crowd-out than the just those who newly became eligible for Medicaid under the ACA. Why might that be the case? Part of the explanation may be that, for those with incomes below 150% FPL, pre-ACA ESI rates were greater in expansion states for all sub-groups, including for non-parents who are more represented in assessments of the effects of Medicaid expansion (Appendix Table 4). The pattern observed in our heterogeneity analysis, then, continues to apply – populations that had higher pre-ACA ESI rates exhibited greater crowd-out estimates, presumably due to having greater ESI access post-ACA.

If the central goal of the ACA is reducing rates of uninsurance, policies that target households with incomes above 250 percent FPL are markedly less efficient, and the opportunity cost of public funds rises. Conversely, policies aimed at expanding coverage among low-income populations — for example, expanding premium tax credits to those with incomes below poverty or expanding Medicaid in non-expansion states — represent considerably more efficient uses of public finances.

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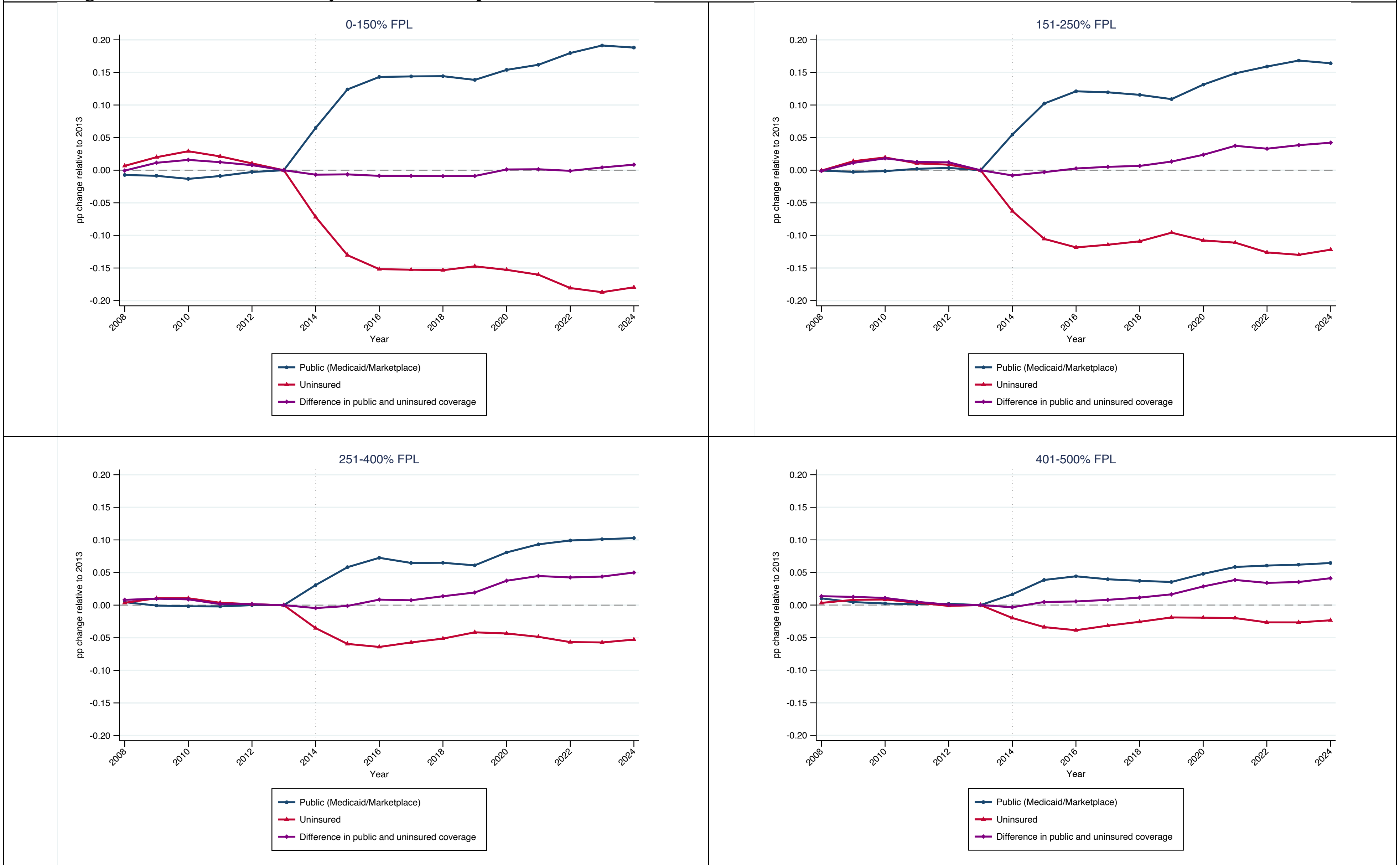
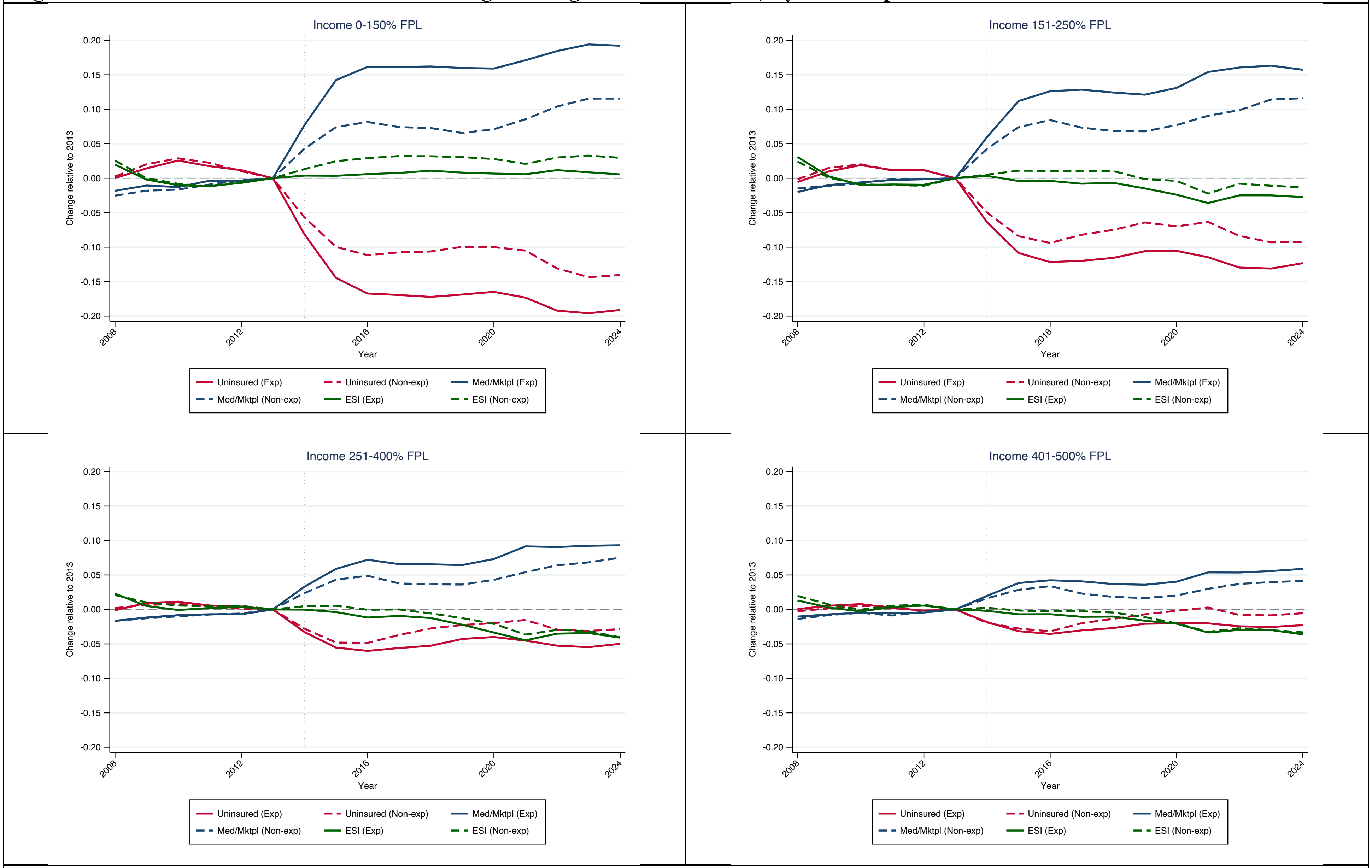
Figure 1. 2008-2024 Changes in Public Insurance Coverage, Uninsured Rates, and the Difference Between Changes in Public Insurance Coverage and Uninsured rates by Income Group



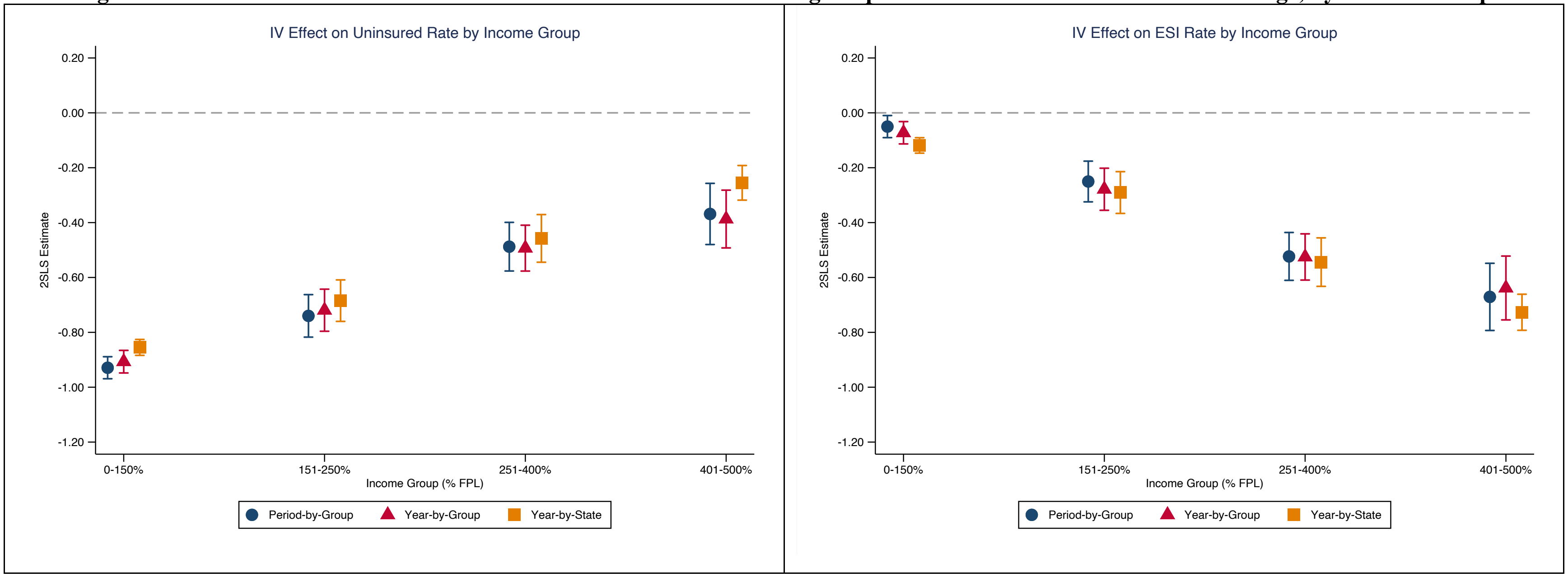
Notes: Data from American Community Survey (ACS) 2008-2024. Sample includes adults ages 19-64. All values normalized to 2013 baseline (2013=0); subsequent years show percentage point change from 2010 levels. Non-expansion states: AL, FL, GA, KS, MS, NC, SC, SD, TN, TX, WI, WY.

Figure 2. 2010-2024 Trends in Insurance Coverage: Changes Relative to 2013, By State Expansion Status and Year



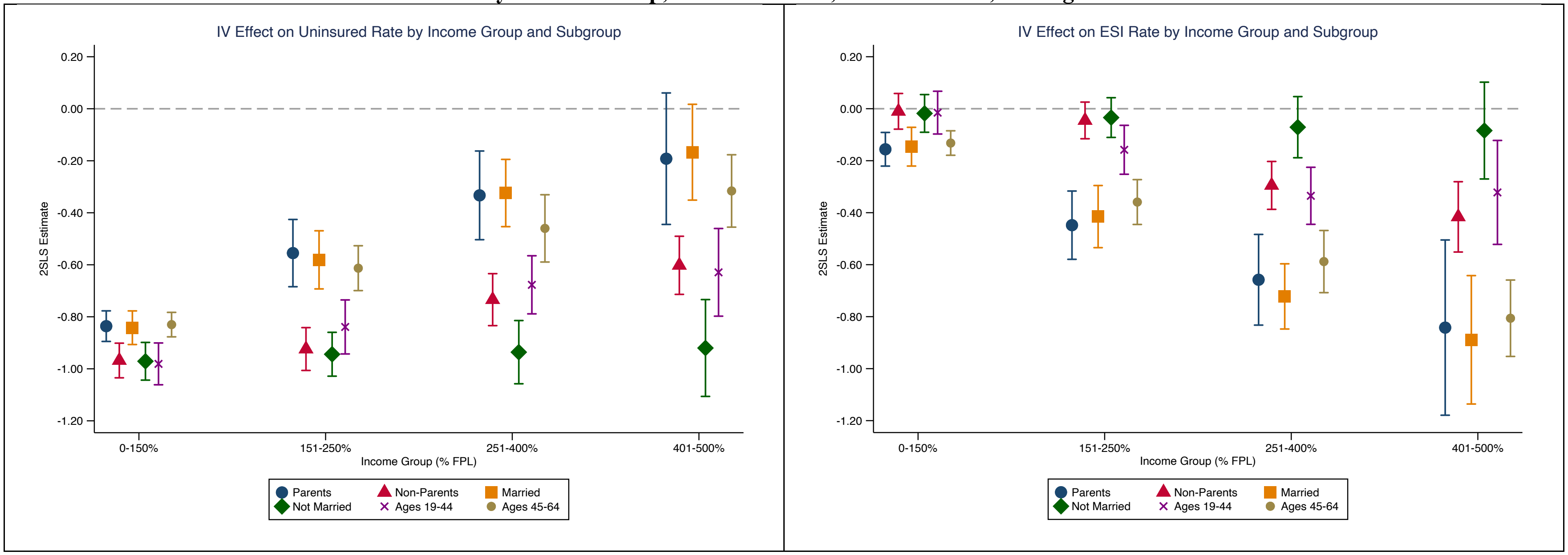
Notes: Data from American Community Survey (ACS) 2008-2024 via IPUMS. Sample includes adults ages 19-64. Medicaid + Purchased combines respondents with either Medicaid or individually purchased coverage (not mutually exclusive). All values normalized to 2013 baseline (2013=0); subsequent years show percentage point change from 2013 levels. Non-expansion states: AL, FL, GA, KS, MS, NC, SC, SD, TN, TX, WI, WY.

Figure 3. IV Estimates of Association between Public Insurance Coverage Expansion and Uninsured and ESI Coverage, by Income Group



Source: 2008-2024 ACS. Notes: IV results from Table 6 for models that do not include year fixed effects in outcome equation. See Table 6 for details on regression specification.

Figure 4. IV Estimates of Association between Public Insurance Coverage Expansion and Uninsured and ESI Coverage by Income Group, Parental Status, Marital Status, and Age



Source: 2008-2024 ACS. Notes: IV results from Table 7 for models. See Table 7 for details on regression specification.

Table 1. ACA Effects on Public Insurance Coverage (Medicaid or Marketplace) by Time Period and Income Group

Public Insurance Coverage	Ever Expanded Definition of Medicaid Expansion			
	0-150% FPL	151-250% FPL	251-400% FPL	401-500% FPL
Non-Expansion State in 2008-2010	-0.011	-0.006	-0.006	-0.002
	(0.007)	(0.004)	(0.003)	(0.002)
Non-Expansion State in 2014-2020	0.046	0.044	0.028	0.017
	(0.008)	(0.006)	(0.005)	(0.004)
Non-Expansion State in 2021-2024	0.074	0.072	0.048	0.025
	(0.011)	(0.010)	(0.008)	(0.006)
Expansion State in 2008-2010	-0.018	-0.013	-0.008	-0.005
	(0.004)	(0.003)	(0.002)	(0.002)
Expansion State in 2014-2020	0.110	0.086	0.050	0.028
	(0.013)	(0.007)	(0.005)	(0.004)
Expansion State in 2021-2024	0.148	0.122	0.074	0.041
	(0.015)	(0.010)	(0.007)	(0.005)

Source: 2008-2024 American Community Survey.
Notes: Sample restricted to respondents ages 19-64. Public insurance refers to any respondents that identify Medicaid or Marketplace coverage. Estimates reflect percentage point change in public insurance coverage in each state group relative to the 2011-2013 reference time period. Regressions include period fixed effects (representing non-expansion state trends), state of residence indicators, interactions of period fixed effects and expansion state group indicators, and the lead, lag, and contemporaneous state unemployment rate reported by the Bureau of Labor Statistics. Medicaid expansion definition is based on whether a state "ever expanded" Medicaid by 2024. Estimates of expansion state by period effects estimated calculating linear combination of period-specific indicators and the expansion-by-period specific indicators. Standard errors are clustered by state of residence.

Table 2. ACA Effects on Uninsured Enrollment by Time Period and Income Group

Uninsured	Ever Expanded Definition of Medicaid Expansion			
	0-150% FPL	151-250% FPL	251-400% FPL	401-500% FPL
Non-Expansion State 2008-2010	0.003	0.001	0.001	0.003
	(0.006)	(0.004)	(0.003)	(0.004)
Non-Expansion State 2014-2020	-0.062	-0.047	-0.018	-0.006
	(0.007)	(0.007)	(0.004)	(0.003)
Non-Expansion State 2021-2024	-0.079	-0.049	-0.009	0.007
	(0.012)	(0.011)	(0.006)	(0.003)
Expansion State 2008-2010	0.011	0.000	-0.002	-0.001
	(0.003)	(0.003)	(0.002)	(0.001)
Expansion State 2014-2020	-0.110	-0.077	-0.035	-0.017
	(0.011)	(0.007)	(0.004)	(0.002)
Expansion State 2021-2024	-0.140	-0.089	-0.035	-0.012
	(0.013)	(0.009)	(0.005)	(0.003)

Source: 2008-2024 American Community Survey.
Notes: Sample restricted to respondents ages 19-64. Estimates reflect percentage point change in uninsurance in each state group relative to the 2011-2013 reference time period. Regressions include period fixed effects (representing non-expansion state trends), state of residence indicators, interactions of period fixed effects and expansion state group indicators, and the lead, lag, and contemporaneous state unemployment rate reported by the Bureau of Labor Statistics. Medicaid expansion definition is based on whether a state “ever expanded” Medicaid by 2024. Estimates of expansion state by period effects estimated calculating linear combination of period-specific indicators and the expansion-by-period specific indicators. Standard errors are clustered by state of residence.

Table 3. ACA Effects on Employer-Sponsored Insurance Coverage by Time Period and Income Group

ESI	Ever Expanded Definition of Medicaid Expansion			
	0-150% FPL	151-250% FPL	251-400% FPL	401-500% FPL
Non-Expansion State 2008-2010	0.008	0.011	0.009	-0.001
	(0.002)	(0.003)	(0.005)	(0.007)
Non-Expansion State 2014-2020	0.015	0.005	-0.011	-0.014
	(0.004)	(0.008)	(0.004)	(0.004)
Non-Expansion State 2021-2024	0.008	-0.016	-0.037	-0.035
	(0.008)	(0.008)	(0.005)	(0.005)
Expansion State 2008-2010	0.007	0.015	0.013	0.007
	(0.002)	(0.003)	(0.002)	(0.002)
Expansion State 2014-2020	-0.001	-0.010	-0.016	-0.012
	(0.003)	(0.004)	(0.003)	(0.003)
Expansion State 2021-2024	-0.003	-0.029	-0.038	-0.030
	(0.004)	(0.005)	(0.005)	(0.004)

Source: 2008-2024 American Community Survey.
Notes: Sample restricted to respondents ages 19-64. Estimates reflect percentage point change in employer-sponsored coverage in each state group relative to the 2011-2013 reference time period. Regressions include period fixed effects (representing non-expansion state trends), state of residence indicators, interactions of period fixed effects and expansion state group indicators, and the lead, lag, and contemporaneous state unemployment rate reported by the Bureau of Labor Statistics. Medicaid expansion definition is based on whether a state "ever expanded" Medicaid by 2024. Estimates of expansion state by period effects estimated calculating linear combination of period-specific indicators and the expansion-by-period specific indicators. Standard errors are clustered by state of residence.

Table 4. IV Estimates of Association between Medicaid and Private Purchase Insurance

	Uninsured						Employer Sponsored					
0-150% FPL	Period-by-Group	Year-by-Group	Year-by-State	Period-by-Group	Year-by-Group	Year-by-State	Period-by-Group	Year-by-Group	Year-by-State	Period-by-Group	Year-by-Group	Year-by-State
Public Insurance Coverage	-0.929 (0.020)	-0.907 (0.021)	-0.855 (0.015)	-0.768 (0.066)	-0.779 (0.063)	-0.790 (0.022)	-0.050 (0.021)	-0.073 (0.021)	-0.119 (0.014)	-0.204 (0.059)	-0.193 (0.056)	-0.177 (0.020)
Year indicators in 2nd Stage	N	N	N	Y	Y	Y	N	N	N	Y	Y	Y
151-250% FPL												
Public Insurance Coverage	-0.740 (0.040)	-0.719 (0.039)	-0.684 (0.039)	-0.651 (0.110)	-0.665 (0.093)	-0.627 (0.057)	-0.250 (0.038)	-0.278 (0.039)	-0.290 (0.039)	-0.383 (0.134)	-0.362 (0.111)	-0.334 (0.057)
Year indicators in 2nd Stage	N	N	N	Y	Y	Y	N	N	N	Y	Y	Y
251-400% FPL												
Public Insurance Coverage	-0.488 (0.045)	-0.493 (0.043)	-0.458 (0.044)	-0.750 (0.112)	-0.740 (0.100)	-0.458 (0.058)	-0.523 (0.045)	-0.525 (0.043)	-0.544 (0.045)	-0.286 (0.120)	-0.294 (0.104)	-0.532 (0.060)
Year indicators in 2nd Stage	N	N	N	Y	Y	Y	N	N	N	Y	Y	Y
401-500% FPL												
Public Insurance Coverage	-0.369 (0.057)	-0.387 (0.054)	-0.255 (0.032)	-0.773 (0.164)	-0.725 (0.162)	-0.223 (0.041)	-0.671 (0.062)	-0.638 (0.059)	-0.727 (0.034)	-0.175 (0.163)	-0.219 (0.151)	-0.734 (0.042)
Year indicators in 2nd Stage	N	N	N	Y	Y	Y	N	N	N	Y	Y	Y

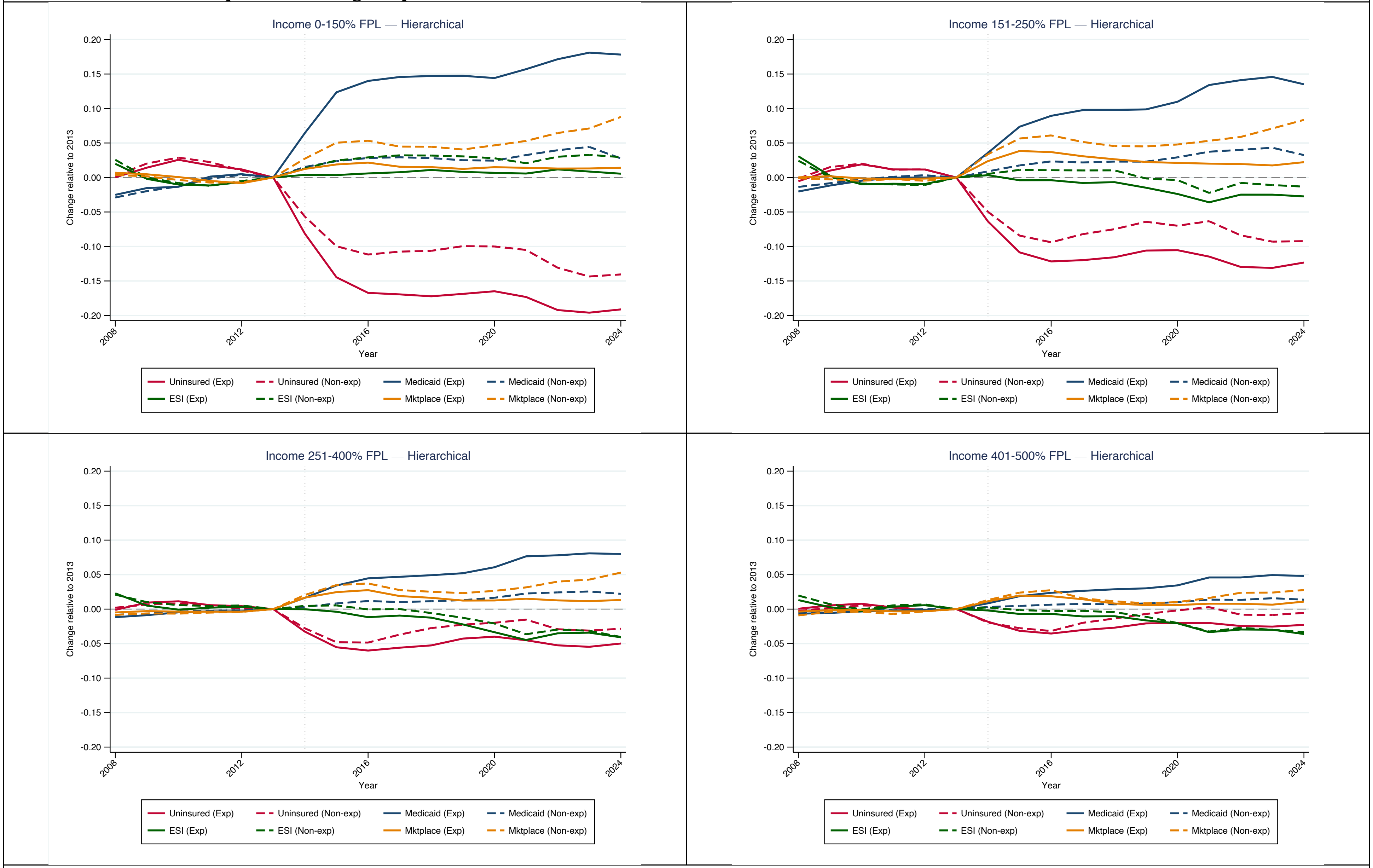
Source: 2008–2024 American Community Survey.
Notes: Sample restricted to respondents ages 19–64. Two-stage least squares (2SLS) estimates of the effect of public insurance coverage (Medicaid or individually purchased plan) on uninsured and employer-sponsored insurance rates. Three instrument sets are reported: Period-by-Group interacts expansion state status with period indicators (2008–2010, 2014–2020, 2021–2024); Year-by-Group interacts expansion state status with individual year indicators (omitting 2013); Year-by-State interacts individual state indicators with year indicators for expansion states. All specifications include state of residence fixed effects and the lead, lag, and contemporaneous state unemployment rate reported by the Bureau of Labor Statistics. Standard errors are clustered by state of residence.

Table 5. IV Estimates of Association between Public Insurance Coverage and Uninsured and ESI coverage rates, by Parental Status, Marital Status, and Age

	Uninsured				Employer Sponsored			
IV Estimate	0-150% FPL	151-250% FPL	251-400% FPL	400-500% FPL	0-150% FPL	151-250% FPL	251-400% FPL	400-500% FPL
Parents	-0.836	-0.555	-0.333	-0.192	-0.156	-0.448	-0.658	-0.842
	(0.030)	(0.066)	(0.087)	(0.129)	(0.033)	(0.067)	(0.089)	(0.172)
Non-Parents	-0.968	-0.924	-0.734	-0.602	-0.010	-0.045	-0.295	-0.416
	(0.034)	(0.042)	(0.051)	(0.057)	(0.035)	(0.036)	(0.047)	(0.069)
Married	-0.842	-0.581	-0.324	-0.167	-0.146	-0.415	-0.722	-0.889
	(0.033)	(0.057)	(0.066)	(0.094)	(0.038)	(0.061)	(0.064)	(0.126)
Not Married	-0.971	-0.944	-0.936	-0.920	-0.018	-0.034	-0.071	-0.084
	(0.037)	(0.043)	(0.062)	(0.095)	(0.037)	(0.039)	(0.060)	(0.095)
Ages 19-44	-0.981	-0.839	-0.677	-0.629	-0.015	-0.158	-0.335	-0.322
	(0.041)	(0.053)	(0.057)	(0.086)	(0.042)	(0.048)	(0.056)	(0.102)
Ages 45-64	-0.830	-0.613	-0.460	-0.316	-0.132	-0.359	-0.588	-0.806
	(0.024)	(0.044)	(0.066)	(0.071)	(0.024)	(0.044)	(0.061)	(0.075)

Source: 2008–2024 American Community Survey.
Notes: Sample restricted to respondents ages 19–64. Period-by-Group two-stage least squares (2SLS) estimates of the effect of public insurance coverage (Medicaid or individually purchased plan) on uninsured and employer-sponsored insurance rates. Each subgroup is estimated separately. All specifications include state of residence fixed effects and the lead, lag, and contemporaneous state unemployment rate reported by the Bureau of Labor Statistics. Standard errors are clustered by state of residence.

Appendix Figure 1. 2010-2024 Trends in Insurance Coverage: Changes Relative to 2013, By State Expansion Status and Year, with Medicaid and Marketplace Coverage Separated



Notes: Data from American Community Survey (ACS) 2010-2024 via IPUMS. Sample includes adults ages 19-64. Medicaid + Purchased combines respondents with either Medicaid or individually purchased coverage (not mutually exclusive). All values normalized to 2013 baseline (2013=0); subsequent years show percentage point change from 2013 levels. Non-expansion states: AL, FL, GA, KS, MS, NC, SC, SD, TN, TX, WI, WY.

Appendix Table 1. ACA Effects on Medicaid Enrollment by Time Period and Income Group

Medicaid	Ever Expanded Definition of Medicaid Expansion			
	0-150% FPL	151-250% FPL	251-400% FPL	401-500% FPL
Non-Expansion State 2008-2010	-0.023	-0.011	-0.006	-0.005
	(0.005)	(0.003)	(0.002)	(0.001)
Non-Expansion State 2014-2020	0.011	0.008	0.005	0.004
	(0.009)	(0.006)	(0.003)	(0.002)
Non-Expansion State 2021-2024	0.023	0.026	0.017	0.011
	(0.013)	(0.009)	(0.005)	(0.003)
Expansion State 2008-2010	-0.029	-0.017	-0.010	-0.006
	(0.004)	(0.003)	(0.002)	(0.001)
Expansion State 2014-2020	0.097	0.062	0.031	0.017
	(0.013)	(0.007)	(0.004)	(0.002)
Expansion State 2021-2024	0.140	0.107	0.062	0.037
	(0.016)	(0.010)	(0.006)	(0.004)

Source: 2008-2024 American Community Survey.
Notes: Sample restricted to respondents ages 19-64. Estimates reflect percentage point change in Medicaid coverage in each state group relative to the 2011-2013 reference time period. Regressions include period fixed effects (representing non-expansion state trends), state of residence indicators, interactions of period fixed effects and expansion state group indicators, and the lead, lag, and contemporaneous state unemployment rate reported by the Bureau of Labor Statistics. Medicaid expansion definition is based on whether a state “ever expanded” Medicaid by 2024. Estimates of expansion state by period effects estimated calculating linear combination of period-specific indicators and the expansion-by-period specific indicators. Standard errors are clustered by state of residence.

Appendix Table 2. ACA Associations with Individual Purchased Plan (Marketplace) Enrollment by Time Period and Income Group

Marketplace	Ever Expanded Definition of Medicaid Expansion			
	0-150% FPL	151-250% FPL	251-400% FPL	401-500% FPL
Non-Expansion State 2008-2010	0.012	0.005	0.000	0.003
	(0.003)	(0.002)	(0.002)	(0.002)
Non-Expansion State 2014-2020	0.035	0.036	0.024	0.013
	(0.004)	(0.005)	(0.004)	(0.003)
Non-Expansion State 2021-2024	0.051	0.047	0.032	0.015
	(0.007)	(0.009)	(0.006)	(0.005)
Expansion State 2008-2010	0.011	0.005	0.002	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Expansion State 2014-2020	0.013	0.024	0.018	0.011
	(0.002)	(0.003)	(0.002)	(0.002)
Expansion State 2021-2024	0.008	0.015	0.012	0.004
	(0.003)	(0.004)	(0.004)	(0.003)

Source: 2008-2024 American Community Survey.
Notes: Sample restricted to respondents ages 19-64. Estimates reflect percentage point change in individually purchased plan coverage in each state group relative to the 2011-2013 reference time period. Regressions include period fixed effects (representing non-expansion state trends), state of residence indicators, interactions of period fixed effects and expansion state group indicators, and the lead, lag, and contemporaneous state unemployment rate reported by the Bureau of Labor Statistics. Medicaid expansion definition is based on whether a state "ever expanded" Medicaid by 2024. Estimates of expansion state by period effects estimated calculating linear combination of period-specific indicators and the expansion-by-period specific indicators. Standard errors are clustered by state of residence.

Appendix Table 3. IV Estimates of Association between Medicaid and Private Purchase Insurance, Using Staggered Rollout Definition of Expansion

	Uninsured						Employer Sponsored					
0-150% FPL	Period-by-Group	Year-by-Group	Year-by-State	Period-by-Group	Year-by-Group	Year-by-State	Period-by-Group	Year-by-Group	Year-by-State	Period-by-Group	Year-by-Group	Year-by-State
Medicaid or Privately Purchased Insurance	-0.892 (0.022)	-0.870 (0.022)	-0.855 (0.015)	-0.750 (0.039)	-0.744 (0.037)	-0.790 (0.022)	-0.098 (0.024)	-0.118 (0.022)	-0.119 (0.014)	-0.241 (0.041)	-0.241 (0.038)	-0.177 (0.020)
Year indicators in 2nd Stage	N	N	N	Y	Y	Y	N	N	N	Y	Y	Y
151-250% FPL												
Medicaid or Privately Purchased Insurance	-0.762 (0.043)	-0.724 (0.039)	-0.684 (0.039)	-0.637 (0.070)	-0.637 (0.063)	-0.627 (0.057)	-0.221 (0.042)	-0.267 (0.040)	-0.290 (0.039)	-0.365 (0.078)	-0.366 (0.070)	-0.334 (0.057)
Year indicators in 2nd Stage	N	N	N	Y	Y	Y	N	N	N	Y	Y	Y
251-400% FPL												
Medicaid or Privately Purchased Insurance	-0.622 (0.056)	-0.583 (0.055)	-0.458 (0.044)	-0.733 (0.115)	-0.699 (0.089)	-0.458 (0.058)	-0.396 (0.053)	-0.433 (0.052)	-0.544 (0.045)	-0.310 (0.110)	-0.332 (0.089)	-0.532 (0.060)
Year indicators in 2nd Stage	N	N	N	Y	Y	Y	N	N	N	Y	Y	Y
401-500% FPL												
Medicaid or Privately Purchased Insurance	-0.530 (0.055)	-0.508 (0.055)	-0.255 (0.032)	-0.726 (0.118)	-0.703 (0.113)	-0.223 (0.041)	-0.476 (0.064)	-0.494 (0.062)	-0.727 (0.034)	-0.276 (0.127)	-0.310 (0.120)	-0.734 (0.042)
Year indicators in 2nd Stage	N	N	N	Y	Y	Y	N	N	N	Y	Y	Y

Source: 2008–2024 American Community Survey.
Notes: Sample restricted to respondents ages 19–64. Two-stage least squares (2SLS) estimates using the state-specific Medicaid expansion timing definition (based on Medicaid expansion dates published by Kaiser Family Foundation), under which late-expanding states are coded as control until their actual expansion year. Endogenous regressor is public insurance coverage (Medicaid or individually purchased plan). Instrument sets defined as in Table 6. All specifications include state of residence fixed effects and the lead, lag, and contemporaneous state unemployment rate reported by the Bureau of Labor Statistics. Standard errors are clustered by state of residence.

Appendix Table 4. 2011-2013 Pre-ACA ESI Rates of Sample By Income, Parental Status, Marital Status, And Age

	2011-2013 ESI Coverage Rates					
All States	**Parents**	**Non-Parents**	**Married**	**Not Married**	**Ages 19-44**	**Ages 45-64**
0-150% FPL	0.206	0.218	0.234	0.203	0.232	0.176
151-250% FPL	0.540	0.421	0.527	0.419	0.469	0.465
251-400% FPL	0.755	0.625	0.733	0.601	0.664	0.681
401-500% FPL	0.850	0.743	0.830	0.704	0.770	0.789
Non-Expansion States	**Parents**	**Non-Parents**	**Married**	**Not Married**	**Ages 19-44**	**Ages 45-64**
0-150% FPL	0.205	0.209	0.223	0.199	0.224	0.174
151-250% FPL	0.520	0.411	0.503	0.410	0.451	0.454
251-400% FPL	0.734	0.604	0.707	0.582	0.644	0.657
401-500% FPL	0.827	0.723	0.808	0.679	0.748	0.768
Expansion States	**Parents**	**Non-Parents**	**Married**	**Not Married**	**Ages 19-44**	**Ages 45-64**
0-150% FPL	0.207	0.222	0.238	0.205	0.236	0.177
151-250% FPL	0.549	0.425	0.537	0.422	0.476	0.469
251-400% FPL	0.762	0.632	0.743	0.608	0.672	0.689
401-500% FPL	0.858	0.750	0.838	0.712	0.777	0.796

Source: 2008–2024 American Community Survey. Notes: Sample restricted to respondents ages 19–64.