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Premium Subsidies, the Mandate, and Medicaid Expansion: Coverage Effects of the Affordable Care Act

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ABSTRACT

Using a combination of subsidized premiums for Marketplace coverage, an individual mandate, and expanded Medicaid eligibility, the Affordable Care Act (ACA) has significantly increased insurance coverage rates. We assessed the relative contributions to insurance changes of these different ACA provisions in the law's first full year, using rating-area level premium data for all 50 states and microdata from the 2012-2014 American Community Survey. We employ a difference-in-difference-in-difference estimation strategy that relies on variation across income groups, areas, and years to causally identify the role of the ACA policy levers. We have four key findings. First, insurance coverage was only moderately responsive to price subsidies, but the subsidies were still large enough to raise coverage by almost one percent of the population; the coverage gains were larger in states that operated their own health insurance exchanges (as opposed to using the federal exchange). Second, the exemptions and tax penalty structure of the individual mandate had little impact on coverage decisions. Third, the law increased Medicaid coverage both among newly eligible populations and those who were previously eligible for Medicaid (the "woodwork" effect), with the latter driven predominantly by states that expanded their programs prior to 2014. Finally, there was no "crowdout" effect of expanded Medicaid on private insurance. Overall, we conclude that exchange premium subsidies produced roughly 40% of the ACA's 2014 coverage gains, and Medicaid the other 60%, of which 2/3 occurred among previously-eligible individuals.

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One of the most significant social policy issues facing the United States over the past forty years has been the high and increasing number of those without health insurance. The number of uninsured Americans rose steadily from the early 1980s through the early 2010s, through both periods of economic recession and economic growth (DeNavas-Walt, Proctor, & Smith, 2013). A major focus of public policy during this era was intervening in insurance markets to expand coverage and offset this trend. This mostly happened using public insurance, via periodic expansions of Medicaid to increasing numbers of low-income individuals and the 1997 creation of the Children's Health Insurance Program. There was much discussion of corresponding private sector interventions to increase coverage (Gruber & Levitt, 2000), although there was relatively little private sector intervention over this period. This pattern of incremental and primarily public coverage expansion changed dramatically with the passage of the Affordable Care Act (ACA) in 2010.

The ACA enacted enormous expansions of both public and private health insurance. The former was to take place through a nationwide expansion of state Medicaid programs to offer coverage to all those with incomes below 138% of the Federal Poverty Level (FPL); however, the Supreme Court subsequently ruled that states could refuse this expansion. The private insurance expansion takes place through sizeable income-based tax credits available to those with incomes from 100% to 400% of FPL who were not eligible for Medicaid, to be used to subsidize the premiums of private insurance policies purchased on newly established state health insurance exchanges. Underlying both of these expansions was a revision of insurance regulations to end discrimination on the basis of pre-existing conditions, coupled with an individual mandate that would require insurance coverage for most Americans (with several

exemptions, most notably related to affordability). These principal pieces of the ACA's coverage expansion took effect in January 2014.[1]

National data from a variety of sources strongly support the notion that the ACA has reduced the uninsurance rate substantially beginning in 2014 (Cohen & Martinez, 2014; Smith & Medalia, 2015; Sommers, Gunja, Finegold, & Musco, 2015). Figure 1 shows the national time series for the rate of uninsurance using household survey data from the Census Bureau and National Center for Health Statistics. The first feature to note is the generally rising profile through both economic downturns and upturns, including a large growth in the uninsured rate associated with the Great Recession of the late 2000s. Then, starting in 2014, there is an immediate and large dip in in the uninsured rate, which by 2015 had reached a historic low. This drop is by far the largest change in the uninsured rate in the time series and has generally been attributed to the ACA. However, most analyses of the ACA's coverage expansions to date have been largely descriptive (Cohen & Martinez, 2014; Long et al., 2014) and/or limited to studying a particular aspect of the ACA such as the Medicaid expansion (Black & Cohen, 2015; Courtemanche, Marton, Ukert, Yelowitz, & Zapata, 2016; Sommers, Gunja, et al., 2015).

Previous expansions of health insurance over the past 30 years have been studied extensively along a number of dimensions. In particular, outcomes of interest have included overall changes in coverage, marginal participation rates (or "take-up"), and offsetting reductions in private insurance associated with public expansions (so-called "crowd-out").[2] While most

[1] The earliest coverage expansion enacted under the ACA was the dependent coverage provision, which mandated that most private insurers allow parents to cover their children as dependents on their insurance through their 26th birthday. This provision took effect beginning in September 2010. We do not examine this policy here, since it had essentially reached steady-state by 2012 and has already been the subject of numerous analyses, which demonstrate significant uptake of coverage by young adults with modest effects on premiums, and minimal labor market effects (Antwi, Moriya, & Simon, 2013; Depew & Bailey, 2015; Wallace & Sommers, 2015).

[2] Another strand of research has examined effects on labor supply among those who are made eligible for public insurance, with conflicting findings (Baicker, Finkelstein, Song, & Taubman, 2014; Garthwaite, Gross, & Notowidigdo, 2014). Early evidence on the ACA suggests that labor market effects to date have been minimal

previous studies have focused on public coverage, research on Massachusetts' health reform in 2006 – often called the precursor to the ACA – offers some insights into the potential effects of private insurance subsidies and an individual mandate. However, there has been little rigorous analysis to date designed to disentangle the different coverage effects of the ACA's various policy provisions.

In this paper, we provide the first comprehensive model of the impacts of both the public and private insurance expansions under the ACA on insurance coverage. To do so, we use data from the American Community Survey (ACS) for the two years before and the first year after full ACA implementation. We estimate rich models that examine both the public coverage expansions and private coverage subsidies that are put in place by the ACA, as well as the individual mandate. Public insurance expansions are identified both by state decisions about whether or not to take up the Medicaid expansions and by differential impacts of Medicaid expansions across the income distribution and by family type. Private insurance subsidies are identified by the substantial variation in effective subsidy rates by income group and area of the country. Mandate effects are identified by variation in both the incidence of a penalty (related to the law's several mandate exemptions) and the extent of the penalty (tied to income and family structure). Our models allow us to control for fixed differences and trends by income group and geographic area.

We have several key findings. First, we find that both private insurance subsidies and public insurance expansions were associated with significant net reductions in the uninsured rate in 2014. The impact of tax credits to private insurance was fairly modest, with each 10% increase in subsidy reducing the uninsured rate by roughly 0.5 percentage points. Premium tax

(Garrett & Kaestner, 2015; Gooptu, Moriya, Simon, & Sommers, 2016; Moriya, Selden, & Simon, 2016), and we do not focus on this issue here.

credits produced larger effects, conditional on subsidy size, in states operating their own state-based insurance exchanges, as opposed to using the federal exchange (healthcare.gov), suggesting potential benefits to local implementation and oversight of the law. All told, exchange insurance subsidies accounted for 38% of the reduction in the uninsured rate attributable to our ACA policy parameters. In contrast, the mandate penalty had a negligible impact on coverage.

Meanwhile, Medicaid expansion increased coverage among newly-eligible individuals by roughly 9 percentage points (with minimal private insurance crowd-out) and accounted for 19% of the observed ACA effect on the uninsured rate. Perhaps surprisingly, the largest measurable policy impact on overall coverage rates in 2014 came via the less discussed "woodwork effect" of increased insurance enrollment among those who were previously eligible for Medicaid before the ACA but not enrolled. This phenomenon explained 43% of the observed ACA coverage impact and was particularly pronounced among the states that started their ACA Medicaid expansions earlier (between 2011-2013) under the law's early expansion option.

Overall, we find that our policy parameterization can explain about 70% of the reduction in insurance coverage from 2012-2013 versus 2014. The remainder is likely due to features of the law that we cannot effectively measure, such as the social impacts of the individual mandate, the availability of new insurance products through state insurance exchanges, and insurance market reforms.

Our paper proceeds as follows. Section I provides background on the ACA and the coverage provisions of that law. Section II reviews the existing literature on how policies such as those included in the ACA impact insurance coverage. Section III describes our data and

policy variables. Section IV presents our empirical strategy. Section V discusses the impact of ACA provisions on insurance coverage. Section VI discusses policy implications and concludes.

I. BACKGROUND ON THE AFFORDABLE CARE ACT

The Affordable Care Act represents the largest transformation of the U.S. health care system since the introduction of the Medicare and Medicaid programs in the mid-1960s. Much of the focus of the ACA was not on insurance coverage per se, but on issues such as health care cost controls and quality of care. We do not explicitly incorporate these provisions into our analysis, although to the extent that they reduced health care costs and/or increased health care quality, they may be responsible for some of the time-series coverage increases not captured by our policy variables.

We instead focus on the coverage provisions of the ACA. There are three key provisions that form the law's "three legged stool" (Krugman, 2011). The first is a federal overhaul of private insurance market regulation. The ACA included provisions that banned the exclusion of preexisting conditions, guaranteed the issue and renewal of insurance regardless of health, and banned health underwriting and rating of insurance premiums. These provisions applied to the entire non-group insurance market, as well as to non-self-insured employers.

The second is the individual mandate. Under the ACA, legal residents of the U.S. are mandated to purchase insurance, subject to a number of exemptions, and those who do not purchase insurance are subject to a tax penalty. This penalty was modest in 2014, the period that we study: equal to the larger of $95 or 1% of income; it has grown more sizeable since, rising to the larger of $695 or 2.5% of income in 2016. There are a variety of exemptions, the most important of which are the "affordability" exemptions, which exempt those with incomes below

the threshold for filing income taxes in the U.S., low-income residents in states that have not expanded Medicaid under the ACA, and those who cannot find insurance on the exchange for less than 8% of income.

The third, and the most important focus of our paper, is comprised of policies to make health insurance more affordable. This includes a massive expansion of public insurance through a universal extension of Medicaid eligibility to all those below 138% of the federal poverty level.[3] This program was previously categorically restricted: some groups (such as children and pregnant women) were typically eligible above this income level, others (such as disabled adults and low-income parents) were only eligible at much lower income levels, and the remainder of low-income adults not fitting into any of these categories (so-called "childless adults") were not eligible at all in most states. The move to a system based only on income, and not on other categorical characteristics, was a large expansion that had differential impacts by state, income group, and family type. An additional element of variation in Medicaid eligibility was the result of a Supreme Court decision in 2012, which made the ACA's Medicaid expansions voluntary. As a result of this decision, only 24 states plus Washington D.C. expanded their Medicaid programs by January 2014; since that time, another 7 states have expanded (Kaiser, 2015).

The other source of financial support for insurance was through the introduction of new tax credits for private insurance purchase through the exchanges, available to qualified applicants during specified open enrollment periods (the first of which ran from October 1, 2013, through March 31, 2014). Individuals are eligible for income-based tax credits if they have a family

[3] The statutory cutoff for Medicaid eligibility under the ACA is 133% of FPL, but requires that states disregard a portion of applicants' income equal to an additional 5% of FPL, producing an effective eligibility threshold of 138% of FPL. Also, note that Medicaid coverage is not available to individuals without either U.S. citizenship or legal permanent residency status for at least 5 years.

income between 138% and 400% of the FPL (or between 100% and 400% of the FPL, if their state has not expanded Medicaid or they are ineligible for Medicaid based on the program's five-year waiting period for legal immigrants). These credits operate to cap the share of income that individuals must pay for exchange-based coverage (at the "silver" level described below) at between 2% of income and 9.5% of income, on a sliding scale basis described at more length in Section III. In addition, the ACA provides cost-sharing subsidies to enrollees with incomes below 250% of FPL, in order to offset a portion of the out-of-pocket costs required by exchange plans.

The ACA included other coverage provisions that are harder to quantify, but which might have significant effects. The first was the introduction of private insurance exchanges, which brought organized shopping to a fractured non-group insurance market. Individuals were able to go to a national or state-specific website to search over options at different levels of generosity, defined by four different "metal" levels based on the plans' actuarial value (the share of expected medical costs covered for the average person): 60% for bronze, 70% for silver, 80% for gold, and 90% for platinum. States had the option of establishing their own exchanges or enrolling individuals through the federal exchange; 16 states plus Washington D.C. created state-based exchanges, though one state (Kentucky) recently announced plans to close theirs and revert to the federal exchange.

A number of states and the federal government had significant technical difficulties with their exchanges, particularly during the initial enrollment period beginning in October 2013. Those problems were largely resolved for the federal exchange by early 2014 before the end of the first open enrollment period, but persisted longer in some states. This may be one reason

why response to exchange-based tax credits could be lower in the first year of the program than in subsequent years.

The ACA includes an "employer mandate" as well. This is a charge levied on firms based on the share of their employees that are not offered affordable coverage who end up receiving exchange tax credits as a result. However, the Obama administration delayed implementation of this provision until 2015, so we do not model this in our analysis.

II. LITERATURE REVIEW

Our paper revolves around several policy levers: public expansions, private insurance subsidies, and an individual mandate. In this section we review the literature on the effects of these policy tools on health insurance coverage, and what is known to date on the ACA's 2014 coverage expansions.

Previous research on public insurance expansions focuses on the very sizeable expansions of the Medicaid program and State Children's Health Insurance program (S-CHIP) over the late 1980s-early 1990s, and again in the late 1990s-early 2000s (Gruber & Simon, 2008; Sommers, Kronick, et al., 2012). The literature finds that take-up of these new expansions was modest, with only about 25-35% of those who became newly-eligible for public insurance coverage choosing to enroll. One reason is that many of those made eligible for public insurance already had private insurance coverage. In addition, even among uninsured individuals, participation rates are often low (under 50% in some states), in part due to complex application processes and lack of information (Sommers, Tomasi, Swartz, & Epstein, 2012).

Some of those with private insurance, however, may have left that coverage for free or heavily subsidized public insurance, a phenomenon that has come to be known as "crowd out"

(Cutler & Gruber, 1996). Estimates of the share of those enrolling in public insurance who would otherwise be on private insurance vary. Some studies have found rates ranging from 20-60% (Gruber & Simon, 2008; Lo Sasso & Buchmueller, 2004), while others have found little to no crowd-out (Hamersma & Kim, 2013; Thorpe & Florence, 1998). In general, crowd-out has been found to be greater among expansions to higher-income groups (Kronick & Gilmer, 2002)

In contrast to the research evidence on Medicaid, there has been much less work on the impact of private insurance subsidies on demand for coverage. One well-cited study (Marquis & Long, 1995) used variation across areas in the price of individual insurance to assess the correlation with insurance coverage; they estimate an elasticity of demand for insurance coverage of -0.4. This is a problematic approach, however, since other factors correlated with insurance demand may drive this price variation. There has been much more work on tax policy and the demand for employer-sponsored insurance; see (Gruber, 2005) for a review. Massachusetts' 2006 health reform law, which featured premium subsidies and a state-based exchange, led to large reductions in the uninsured rate (Long, Stockley, & Yemane, 2009). However, the state law's other features (including an individual and employer mandate) complicate the interpretation of these findings, and previous research has not attempted to disentangle the precise effects of the subsidies versus these other provisions.

There is also less understanding of how the individual mandate impacts coverage and how it interacts with the other provisions of the ACA. Again, the best evidence comes from the experience of Massachusetts, which introduced an individual mandate in 2006 along with generously subsidized private insurance. In addition to the general decline in the uninsured rate noted above, prior research shows several interesting spillover effects of the mandate. First, individuals who were already eligible for the state's Medicaid program but not yet enrolled

significantly increased their participation in the program (Sonier, Boudreaux, & Blewett, 2013). Second, despite very generous non-employer insurance subsidies and a weak employer mandate, there was no erosion of employer-sponsored coverage in Massachusetts – and in fact some evidence that employer coverage increased (Kolstad & Kowalski, 2012). This may reflect a response to the individual mandate requirement, which may have caused workers to be willing to accept lower wages in return for employer coverage (Hackmann, Kolstad, & Kowalski, 2015).

In terms of the ACA's Medicaid and exchange expansions, a growing body of research has begun to document changes in coverage under the law.[4] Several states opted to expand Medicaid under the ACA prior to 2014, and studies indicate small marginal changes in coverage with variable crowd-out – little among those with health problems, but significant crowd-out among younger adults (Sommers, Kenney, & Epstein, 2014). In terms of the 2014 expansion, federal survey data (Cohen & Martinez, 2014; Smith & Medalia, 2015) and private data sources (Shartzer, Long, Karpman, Kenney, & Zuckerman, 2015; Sommers, Musco, et al., 2014) both confirm a large drop in the uninsured rate nationally, particularly among lower-income adults and those in Medicaid-expansion states. A time-series analysis estimated that roughly half of the coverage gains in 2014 were due to Marketplace gains and half from Medicaid (Carman, Eibner, & Paddock, 2015), though the authors did not attempt to model household coverage decisions and simply presented descriptive trends over time. Finally, several recent analyses using alternative identification strategies and data sources estimated coverage gains in the range of 4 to 6 percentage points due to the 2014 Medicaid expansion (Courtemanche et al., 2016; Kaestner, Garrett, Gangopadhyaya, & Fleming, 2015; Sommers, Gunja, et al., 2015). To our knowledge,

[4] See also footnote 1 regarding research on the ACA's dependent coverage provision, enabling young adults to remain on their parents' plans through age 26.

no research to date has modeled the full scope of coverage-related provisions in the ACA simultaneously in order to disentangle their various effects.

III. DATA AND POLICY MEASUREMENT

III.A Data

Our primary source of data for this analysis is the American Community Survey (ACS), for the years 2012-2014. The ACS is a national survey administered annually by the United States Census Bureau. It is the largest household survey in the country, with approximately 3 million individuals surveyed in the public-use file each year and response rates ranging from 90-97%. Within-state geographical information is available in the ACS based on approximately 2350 "public use microdata areas" (PUMAs). PUMAs are mutually exclusive areas within state boundaries that are populated with at least 100,000 individuals, which have been used previously to study changes in insurance coverage within states (Sommers, Chua, Kenney, Long, & McMorrow, 2016). The ACS is one of the primary sources in the Census Bureau's annual reports on health insurance coverage (Smith & Medalia, 2015) and is frequently cited by the federal government in assessing coverage changes under the ACA (Finegold & Gunja, 2014).

Our study sample includes all non-elderly (age under 65) individuals residing in the U.S., other than in Massachusetts. We exclude the elderly from our analysis because the ACA's coverage expansions did not apply to individuals 65 and over, over 99% of whom are already insured via Medicare. We excluded Massachusetts because the state's own 2006 health reform law – upon which the ACA was largely modeled – already included premium subsidies, a health insurance exchange, and an individual mandate, although with slightly different statutory details. Our national results are essentially unchanged by this exclusion, as Massachusetts accounts for

only 2% of the U.S.'s non-elderly population. Finally, we adjusted self-reported income in the survey as follows: negative incomes were recoded as $0 and incomes above the 99th percentile each year were recoded as the 99th percentile.

Our dependent variables of interest in the ACS are four measures of insurance coverage. Specifically, we focus on those individuals reporting no health insurance (uninsured) and the following three categories of insurance: Medicaid, employer-sponsored insurance (ESI), and non-group private insurance. Together, these four categories are inclusive of 98-99% of non-elderly individuals in the survey, with the remainder insured by the VA or Medicare due to non-age related criteria. Our category of ESI included both military coverage and coverage provided by a union. Regarding Medicaid, it is important to note that the ACS's question on this topic is broadly worded and asks about "Medicaid, Medical Assistance, or any kind of government-assistance plan for those with low incomes or a disability." Thus, some respondents may answer "yes" to this question based on their receipt of government subsidized coverage via the exchange, while others may report this as non-group coverage (i.e. "Insurance purchased directly from an insurance company").[5] As we see below, we find evidence that premium subsidies have a positive effect on the likelihood of both Medicaid /government assistance coverage (hereafter "Medicaid") and non-group coverage, suggesting exchange insurance is manifesting in both of these types of coverage assessed in the survey.

III.B Policy Measures

The ACA marks an enormous change in government policy towards insurance coverage.

[5] The ACS, while generally quite reliable at assessing health insurance coverage and used by the Census in its annual reports on insurance of the U.S. population, does produce overestimates of non-group coverage compared to other data sources (Mach & O'Hara, 2011). However, our study design, which identifies changes in coverage over time as a function of policy variation, should subtract out any time-invariant overreporting bias for this form of coverage in the survey.

Fortunately for research purposes, many of the changes embodied in the law vary substantially across individuals in a way that can be readily parameterized in models of insurance coverage. Other factors are more uniform and difficult to separate from non-ACA conditions that may more generally impact insurance coverage.

III.B.1 Medicaid Eligibility

Our first policy measure is eligibility for Medicaid, which we combine with eligibility for the related Children's Health Insurance Program (CHIP). We decompose Medicaid eligibility in 2014 into two parts: eligibility prior to the 2014 Medicaid expansion (i.e., those who were eligible for Medicaid using 2013 income thresholds and criteria, including early expansion states), and new eligibility as a result of the 2014 Medicaid expansion. The former group is known as the "woodwork" (or, alternatively, "welcome mat") population that may newly take up Medicaid coverage due to increased awareness of coverage options under the ACA, streamlining of the application process required by the law, and the individual mandate (Sommers & Epstein, 2011). Both measures of Medicaid eligibility are constructed using existing state rules based on age, income, disability, and parental status obtained from the Centers for Medicare and Medicaid Services and the Kaiser Family Foundation.[6]

Figure 2 depicts the percent of the population eligible in 2014 for Medicaid/CHIP, based on state expansion status. Panel A shows the distribution for children, and Panel B shows the

[6] Medicaid and CHIP eligibility for children, parents, and childless adults was obtained for each state, as of 2013, from a pre-ACA survey of all 50 states conducted by the Kaiser Family Foundation (Heberlein, Brooks, Aiker, Artiga, & Stephen, 2013), supplemented by information on the ACA's early-expansion states (Sommers, Arntson, Kenney, & Epstein, 2013; Sommers et al., 2016). Information on disability-related eligibility is also from Kaiser (Kaiser, 2010); adult disability was identified in the ACS using their disability recode variable, which encompasses hearing, vision, cognitive, ambulatory, and self-care difficulties, among others. 2014 eligibility was updated with information from the Centers for Medicaid & CHIP Services (CMS, 2014). The ACS does not report information of pregnancy and pregnancy-related eligibility in Medicaid is time-limited, so we do not attempt to model that pathway of eligibility here. We apply the ACA's statutory 5% income disregard to all MAGI-eligible groups (groups who income is totaled using the notion of Modified Gross Adjusted Income).

distribution for adults. The figure shows that all children under the poverty line are eligible for public insurance, regardless of state expansion decision. In the 200-300% of FPL range, where coverage is typically via CHIP, eligibility trails off – more steeply in non-expansion states (which have traditionally been less generous with coverage for both adults and children). Meanwhile, for adults, expansion states offer eligibility to everyone with incomes up to 138% of FPL, while a minority of adults in non-expansion states meet both income and categorical criteria for eligibility. The uptick in adult Medicaid eligibility observed between 70% and 80% FPL is a result of many states' eligibility thresholds for disabled individuals being clustered in that range combined with a disproportionately high number of disabled individuals at that income level. Only a handful of adults with incomes above 138% of FPL are eligible, depending on the state.

III.B.2 Exchange Premium Subsidies

Our second policy measure is the net subsidy rate to insurance purchased through the ACA's exchanges, which take the form of advanced refundable tax credits. Since premiums on the exchange are defined based on the family unit, our analysis models the premiums and subsidies using the notion of the health insurance unit (HIU) – defined as an adult, his/her spouse, and their dependent children in the household, but not including unrelated roommates or other adult relatives (such as grandparents) in the household. This corresponds to the family unit upon which premium subsidies and Medicaid eligibility is based, and we use the term "family" and HIU interchangeably below.

To construct the subsidy rate measure for each HIU, we first calculate an unsubsidized premium for each HIU based on the ACA rating area they resided in. Under the ACA, each state

has defined geographical rating areas. Within each rating area, insurers devise their plan offerings and set premiums. As rating areas do not always directly correspond to the finest geographical level available in the ACS (PUMAs), we use a matching process as follows. In cases where a single rating area mapped directly to a PUMA, we use simple matching of premiums to individuals. In cases where multiple rating areas spanned a single PUMA, we weight the relevant rating-area level premiums based on the proportion of the PUMA's population contained in each rating area before matching to individuals.

The unsubsidized premium for each HIU is based on the sum of the individual premiums for each of its members, with no more than three covered children included in the sum based on federal regulations. Individual premiums are based on the second-lowest-cost silver plan available in the HIU's rating area, obtained from the Robert Wood Johnson Foundation. We use this plan for two reasons. First, the silver tier is the most commonly purchased tier of coverage under the ACA; 65% of consumers in the first open enrollment period (ASPE, 2014). Second, the second-lowest cost silver plan in the one to which the ACA's premium tax credits are pegged. All unsubsidized premiums are age-adjusted using state-specific age-rated premium curves obtained from the Centers for Medicare & Medicaid Services.

Then, we calculate the net premium including subsidy for each family. Families with incomes below 100% of FPL or above 400% of FPL, and those eligible for Medicaid or CHIP are ineligible for exchange subsidies. For the remainder of the sample (Medicaid-ineligible individuals with incomes between 100-400% of FPL), net premiums are calculated based on the ACA's income-based subsidy schedule, which determines premium payments on a sliding scale

percentage of income.[7] Net premiums are then converted into *Percentage subsidy* based on the formula: 1 – (*Net Premium / Unsubsidized Premium).*

Figure 3 shows the percent subsidy as a function of FPL and Medicaid expansion status. In non-expansion states, premium subsidies are available starting at 100% of FPL; in expansion states, where such families are eligible for Medicaid, subsidies begin at 138% of FPL.[8] Subsidy rates peak at about two-thirds for non-expansion states for those between 100-138% of FPL, and slightly over half for those just above 138% of FPL in expansion states. From those respective peaks and up through 400% of FPL, the subsidy rate declines steadily but not quite linearly in keeping with the ACA's tax credit scheme.

III.B.3 Mandate

Our third policy measure is the tax penalty associated with the individual mandate. Fundamentally, the existence of the mandate is just a time series change which cannot be separated from year effects in our model, and to the extent that the mandate creates a generalized "taste for compliance" (Saltzman, Eibner, & Enthoven, 2015), we will be unable to capture that effect in our model. However, in principle, the mandate does not impact those who are exempted based on their income, and due to other non-linearities in the mandate penalty amount, families may be exposed to different potential levels of tax penalties in the event that they do not obtain health insurance. We therefore construct a measure representing each family's tax penalty

[7] Premium tax credits are pegged to the following thresholds: 2% of income for individuals with incomes up to 133% of FPL; 3-4% of income for individuals with incomes between 133-150% of FPL; 4.0-6.3% of income for individuals with incomes between 150-200% of FPL; 6.3-8.05% of income for individuals with incomes between 200-250% of FPL; 8.05-9.5% of income for individuals with incomes between 250-300% of FPL; and 9.5% of income for individuals with incomes between 350-400% of FPL.

[8] For legal immigrants not eligible for Medicaid, tax credits are available for incomes 100-138% in expansion states. The ACS does not enable us to distinguish between legal and undocumented immigrants, though it does include a question on self-reported citizenship. We test the robustness of our results to this issue by excluding all non-citizens from our sample, and the results are quite similar to our main findings.

in dollars due to the mandate. The penalty is equal to $0 for families exempt due to any of the following (with the percentage of the sample affected by each exemption listed in parentheses): 1) family income below the federal tax-filing threshold[9] (20.7%); 2) family income below 138% of FPL in a state that elected not to expand Medicaid (5.5%); 3) Native Americans (0.6%); or 4) no affordable coverage available, defined as the lowest-cost option having a premium greater than 8% of family income (10.2%). This last exemption was estimated based on the lowest-cost bronze-level plan in each rating area, which was obtained from the premium data published on healthcare.gov.[10] For the 63% of our sample subject to the mandate, the family-level mandate penalty is calculated based on the ACA criteria for 2014: equal to $95 per uninsured adult or 1% of taxable income, whichever is greater.[11]

Figure 4's Panel A shows the average mandate penalty per family by income and Medicaid expansion status, and Panel B shows the percent subject to the mandate (i.e. not exempt). No one below 138% of FPL in non-expansion states is subject to the mandate, while in expansion states, the mandate takes effect at the tax-filing threshold. Between 138% and 400% of FPL, most families are subject to the mandate, with an increasing penalty as a function of income. Near and above the 400% premium subsidy cutoff, however, a substantial portion of families are exempt based on the affordability criterion, as without generous premium subsidies,

[9] We utilized the following 2014 tax-filing thresholds: $10,150 for single non-elderly individuals; $20,300 for married couples filing jointly; and $13,050 for 'heads of household' (i.e., multi-individual HIUs without a married couple).

[10] Healthcare.gov provides county-level bronze premium data for states on the federal exchange, which are not available in the data source we use for our silver-level premiums. Thus, for the 16 states using state-based exchanges, we imputed the lowest-cost bronze premiums for each rating area using a regression model to predict the ratio of second-lowest-cost silver plan to lowest-cost bronze plan as a function of the following variables: number of silver plans, ratio of maximum to minimum silver premium, ratio of maximum to second-lowest silver premium, ratio of median to second-lowest silver premium, ratio of second-lowest to minimum silver premium, and PUMA-level demographic measures from the ACS for age, sex, race, citizenship, education, disability, parental status, marital status, and household size.

[11] More precisely, the mandate penalty in 2014 was equal to $95 per uninsured adult and half of that per uninsured individual under 18 years of age, and the income measure is defined as 1% of "applicable income," which is income above the tax-filing threshold. The mandate penalty is additionally capped at the national average premium for bronze-level health plans offered by the health insurance exchanges.

they face a lowest cost bronze plan with premiums in excess of 8% of income. At the highest income range, more than 90% of families are subject to the mandate and the average penalty exceeds $1000 per family.

IV. EMPIRICAL STRATEGY

Our overall empirical strategy starts with a longitudinal design that uses geographical and income-based variation in the ACA policy levers to identify changes in coverage over time, with fixed effects for years, geographical region, and income. At the HIU level, this suggests a regression model of the form:

$$
\begin{aligned}
(1)\ \%Uninsured_{ijt} = {} & \beta_0 + \beta_1 PercentSubsidy_{ij} + \beta_2 MandatePenalty_{ij} \\
& + \beta_3 McaidEligiblePreACA_{ij} + \beta_4 McaidNewlyEligible_{ij} \\
& + \beta_5 PercentSubsidy_{ij} * Yr2014_t + \beta_6 MandatePenalty_{ij} * Yr2014_t \\
& + \beta_7 McaidEligiblePreACA_{ij} * Yr2014_t + \beta_8 McaidNewlyEligible_{ij} * Yr2014_t \\
& + \Omega\ Area_j + \partial\ Year_t + \mu\ Income_i + \beta_x X_{ijt} + \varepsilon_{ijt}
\end{aligned}
$$

where *i* indexes the family (HIU), *j* indexes the geographical area, and *t* indexes time (year). The coefficients of interest would be β_5 through β_8, which measure the impact of the ACA policy variables in 2014. β_1 through β_4 capture the baseline (pre-ACA) direct effects of the puma-income policy variables, Ω is a vector of area fixed effects (either PUMA level or state level, depending on the model), and ∂ is a vector of year fixed effects, and μ is a vector of fixed effects for different income groups by percentage of FPL. X_{ijt} is a vector of demographics containing for the following characteristics based on the adults in the family: race/ethnicity, marital status, citizenship, age, educational attainment, and number of children.

The model includes data from 2012-2014. All of our policy measures take on their 2014 values in each year. In this way, we can use the 2012-2013 period to control for other geographic and income group differences that might be correlated with our outcomes of interest. Essentially, this allows us to do a difference-in-difference-in-difference model across PUMAs, income groups, and time. It also enables us to conduct a series of falsification tests using just the 2012-2013 data to test whether our policy variables were already correlated with time-varying trends in coverage that could bias our 2014 estimates.

However, even with the use of the difference-in-difference-in-difference model, estimating Equation 1 raises a number of identification concerns. Primary among these is the potential endogeneity of income and eligibility, due to state-level differences in the income distribution that may be related to both insurance premiums and the Medicaid expansion decision, as well as omitted factors correlated with both family income and tastes for insurance. For example, lower income families are more likely to be eligible for Medicaid, and they may have higher or lower tastes for insurance for other reasons. In addition, the economic recovery may differ across regions leading to non-ACA related differences in the availability of Medicaid and premium subsidies. In principle, we could address these problems through rich controls for income, but given highly non-linear patterns of Medicaid eligibility and tax credit values by income group, it would be difficult to rule out omitted correlations.

We address these concern through the use of a "simulated" measure of eligibility (Currie & Gruber, 1996a, 1996b; Cutler & Gruber, 1996). For this measure, we first group all families into 12 income bands.[12] For each income band, we randomly select from the national sample up

[12] The income bands were: 0-50% FPL, 50-100% FPL, 100-138% FPL, 138-200% FPL, 200-250% FPL, 250-300% FPL, 300-350% FPL, 350-400% FPL, 400-500% FPL, 500-600% FPL, 600-800% FPL, and greater than 800% FPL.

to 200 families of each of three types – single adults, adult couples,[13] and families with children – such that the total number of individuals sampled per group is approximately 200. We then assign this same sample to each PUMA in our data and estimate the value of our policy variables for that family type-PUMA-income group cell.

The resulting measure computes, for example, the average subsidy rate for a representative set of single adults from 100-138% of FPL, in each PUMA in the nation. This is effectively a parameterization of how PUMA-level variation in insurance premiums and tax credits drives subsidy rate variation by income group. Critically, this approach allows us to capture the variation in subsidies by income group and PUMA, but to also rigorously control for any direct influences of income and PUMA by putting in a full set of 12 income category dummies and PUMA dummies. That is, conditional on the inclusion of 12 income category dummies, a full set of PUMA dummies, and a set of year dummies, the only variation that identifies this model is interactions of PUMA, income and year, and not direct effects of any of these factors. Of course, it is plausible that some of these interactions are also not legitimately excluded from the empirical model. In the analysis below, we will control for additional interactions as well to address these concerns.

These simulated measures for our policy variables can serve as instruments for each family's actual premium subsidy, mandate penalty, and Medicaid eligibility as described in Equation 1 above.

In fact, the first stage regression for such a 2SLS estimate is close to one for each policy measure, so that IV and reduced form estimates give almost identical answers (as shown below). Thus, for many of our analyses we focus on the reduced form model described in Equation 2,

[13] This group contains families with 2 adults and no children 18 or younger. Approximately 99% of the HIUs in this group are married couples. The others are typically single parents with adult dependents (e.g. a 20 year-old student).

using simulated policy measures as the independent variables of interest (designed below with the prefix SIM):

$$(2)\ \%Uninsured_{ijt} = \beta_0 + \beta_1 SIMPercentSubsidy_{ij} + \beta_2 SIMMandatePenalty_{ij}$$
$$+ \beta_3 SIMMcaidEligiblePreACA_{ij} + \beta_4 SIMMcaidNewlyEligible_{ij}$$
$$+ \beta_5 SIMPercentSubsidy_{ij} * Yr2014_t + \beta_6 SIMMandatePenalty_{ij} * Yr2014_t$$
$$+ \beta_7 SIMMcaidEligiblePreACA_{ij} * Yr2014_t + \beta_8 SIMMcaidNewlyEligible_{ij} * Yr2014_t$$
$$+ \Omega\ Area_j + \partial\ Year_t + \mu\ Income_i + \beta_x X_{ijt} + \varepsilon_{ijt}$$

where, as before, *i* indexes the family (HIU), *j* indexes the geographical area, and *t* indexes time (year). The coefficients of interest are β_5 through β_8 which measure the impact of the *simulated* ACA policy variables in 2014. We estimate this model separately by type of family (single adults, adult couples, and families with children), as well as a pooled model that includes all family types. For the pooled model, we include a separate set of controls for HIU type, as well as interactions of HIU type with income, area (state or PUMA), and year. In alternative models discussed below, we replace the income and area fixed effects with a set of income-PUMA interacted fixed effects; in this model, the direct effects of the five policy variables (β_1 through β_5) are completely captured by the income-PUMA fixed effects and thus are dropped from the model. The remaining variables are the same as defined in Equation (1).

Alternative models replace the dependent variable with different coverage types (Medicaid, ESI, and non-group private). We also consider alternative specifications for the mandate penalty and premium subsidy variables, as described in section V.D below. In all models, we use ACS survey weights aggregated at the HIU-level to produce nationally-representative estimates of the U.S. non-elderly population. We also use robust standard errors

for all models clustered at the level of the PUMA, given the rating-area variation that our difference-in-difference-in-difference approach relies upon.

V. RESULTS

V.A Summary Statistics and Coverage Trends

Table 1 presents summary statistics for our sample in 2014, including insurance outcomes and policy variables by family type. Overall, 14% of the sample is uninsured; uninsurance is highest in families with children, and lowest among adult couples. Roughly one-quarter of the population was Medicaid eligible before 2014, while another 5% became eligible in 2014. Pre-existing eligibility was highest among families with children (36% of the group), while the ACA expanded eligibility most notably among single adults. Overall, 63% of the sample is subject to the mandate. The average unsubsidized premium is slightly more than $8000; it is higher on average for adult couples than for families with children or single adults, due to age differences across the groups. The subsidy rate is fairly stable across groups, averaging 16.2%.

Table 2 shows the time series for our insurance outcomes, which indicate a net decrease in the uninsured rate of roughly 3.4 percentage points from the 2012-2013 period to 2014, a 1.6 percentage point increase in Medicaid, 0.4 percentage point increase in ESI, and 1.0 percentage point increase in non-group private coverage.

V.B IV and Reduced Form Model Results

Table 3 shows the results of estimating Equation 1 above using a two-stage least squares model; due to computational constraints with the IV model, we control for state rather than

PUMA. We show IV estimates in column 1 and reduced form results using Equation 2 in column 2. The estimates are virtually identical for each policy measure that we consider. Therefore, we focus on the reduced form estimates for the remainder of the paper.

We estimate a significant negative effect of the subsidy rate on the risk of being uninsured. The subsidy rate estimate shows that for each 1.0 percentage-point of subsidy, the uninsured rate falls by 0.052 percentage points. Put another way, each 10% increase in average subsidy produces a decrease in the uninsured rate of 0.52 percentage points, equal to roughly 1.4 million Americans (given 273 million non-elderly Americans in 2014).

The coefficient on our individual-level measure of the mandate penalty is statistically significant, but quite small in magnitude and presumably wrong-signed (i.e. higher mandate leads to more uninsured). The magnitude of the coefficient implies that each $100 in mandate (when the average penalty is roughly $460) increases the uninsured rate by 0.01 percentage-points, which is negligible and suggests that the statistical significance here may be more reflective of the immense sample size in the ACS rather than any true effect. Moreover, it may indicate that our attempt to individually parameterize this measure was imprecise. This could be because individuals are not aware of the precise exemption parameters, or because they do not respond to the affordability exemption. It does not necessarily imply that the mandate had no effect, though it does suggest that individuals did not respond to their income-specific mandate. This still leaves open the possibility of a more general impact of a "taste for compliance" that some have hypothesized (Saltzman et al., 2015), or that the mandate penalty may have more impact in future years as the penalty size increases.

The coefficients on both of our public insurance expansion variables are highly significant and consistent with expansions reducing the uninsured rate. The results indicate a

marginal reduction in the uninsured rate of 8.8 percentage points among individuals made newly for Medicaid. Meanwhile, we also detect large insurance changes among those who were previously eligible for Medicaid. Our coefficient suggests that for the ACA expansion lead to a 4.0 percentage-point increase in coverage for those who were already eligible for Medicaid prior to 2014 – the so-called "woodwork effect."

The next set of coefficients show the direct impact of our policy measures when not interacted with 2014 – e.g. the impact in earlier years. Pre-existing Medicaid eligibility is negatively associated with uninsurance in earlier years, as one would expect. But it is somewhat surprising that there are significant coefficients on the other policy measures. This suggests the possibility of omitted factors across PUMA-income cells that are correlated with both our policy measures and insurance coverage. We can address this concern by further enriching the model to incorporate interactions of PUMA and income category, so that the identification purely comes from differences in effects within each PUMA-income category. We do so in Table 5, with no impact on the results. This also indicates the importance of our difference-in-difference-in-difference approach, which more plausibly provides identifies ACA causal effects than would a simple single-year analysis of 2014 data as a function of our policy variables and a rich set of controls. We also test whether these correlations between the policy variables and insurance coverage were changing prior to the ACA, using falsification testing described in Section V.G that offers support for our general approach.

V.C Decomposing Coverage Changes by ACA Policy Provision

In Table 4, we apply our reduced form estimates to model the population-level changes in insurance coverage in 2014 that is accounted for by these aspects of the ACA. As mentioned

earlier, over the period from 2012-2013 to 2014, the rate of uninsurance as measured by the ACS fell by 3.4 percentage points. We find that the average 16% subsidy to exchange coverage in the full sample implies a reduction in uninsurance of 0.85 percentage points. There is essentially no material impact of the mandate exemption, so we ignore this in our calculations. We estimate that the 2014 Medicaid expansion to 4.9% of our sample reduced uninsurance by 0.43 percentage points. And we estimate that the "woodwork effect" on the 24.8% of our sample that was already eligible for Medicaid/CHIP led to a decline in uninsurance of 1.00 percentage points.

Taken together, the policy variables in our model sum to a 2.3 percentage point reduction in the uninsured rate. Of that sum, 37% is attributable in our model to premium subsidies, 19% to the expansion of Medicaid eligibility in 2014, and 44% to the woodwork effect. Overall, the 2.3 percentage-point reduction in insurance estimated by our policy variables explains approximately 70% of the decline observed during the first year of the ACA. Several other analyses have attributed nearly all of the national change in coverage in 2014 to the ACA, as even after adjustment for the improving economy (Blumberg, Garrett, & Holahan, 2016; Sommers, Musco, et al., 2014). Thus, the remaining 30% of the decline in uninsurance in 2014 may be due to other unmeasured aspects of the ACA, such as the social effects of the individual mandate, simplification of purchasing coverage due to the creation of the marketplaces, as well as any measurement error in our approach to modeling our policy variables.

V.D Robustness Checks

Table 5 considers the robustness of our estimates to variation in the specification from Equation 2. We begin, in column 1, by showing the same reduced form model used in Table 3, but replacing state fixed effects with PUMA fixed effects. This has no meaningful impact on the

results, which are nearly identical to the baseline specification. Columns (2)-(4) then include various second-level interactions in the model to ensure that there are no other omitted variables driving the results. Column 2 allows for an interaction between PUMA dummies and income categories. This allows us to drop the direct inclusion of our simulated policy variables (which are set at the PUMA-income level), and leave in only the policy interactions with *Year2014*. This address the concern that there may be differential geographical variation in outcomes by income group. The results again are nearly identical.

Column 3 allows for PUMA-income interactions as well as income-year fixed effects, to address possible concerns that there were time-varying differences in insurance trends in 2014 across income groups that were unrelated to the ACA's policy variables. This model reduced the point estimates somewhat, though with the same basic pattern, and the mandate penalty becomes negative, indicating a higher mandate penalty reduces the uninsured rate – though with a point estimate that is still extremely small. Column 4 introduces PUMA-year interactions, as well as income-year interactions, which allows for geography time-varying changes not associated with the ACA policy features, and again we obtain generally similar estimates for premium subsidies and Medicaid eligibility, and the mandate penalty is now non-significant.

We also consider the effect of replacing the *Mandate Penalty* variable with a measure for *Any Mandate*, which describes the percent of families that are not exempt from the mandate, rather of the per-family penalty amount. These results, shown in column 5, are similar to our main model and again demonstrate little impact of the mandate.

Finally, we consider an alternative parameterization of the tax credit policy under the ACA, by using the net premium rather than the percentage subsidy. In theory, the net premium enters directly into the budget constraint and should drive responses by families. In practice, this

is complicated by the fact that the net premium may capture unobserved determinants of health care costs or coverage quality that vary by area and income group. If so, then the price elasticity estimated from the net premium will be biased downward: higher premiums will be correlated with higher insurance demand through unobserved factors.

Column (6) replaces the subsidy rate measure with a net premium measure in our basic model (2). We estimate a significant positive effect of the net premium on uninsurance, but the implied effect is much smaller than that captured by the percent subsidy in our primary model. Applying the change in net premium to the type of time series exercise shown in Table 4, we estimate a change in uninsured due to the ACA of only 0.38 percentage points, as opposed to the 0.85 percentage points estimated from the percent subsidy.

Column (7) shows that when the two measures are included together, the data clearly prefer the percent subsidy measure to the net premium measure. The coefficient for the former is essentially unchanged from our baseline model, while the coefficient for the latter is essentially zero, when controlling for the percent subsidy. These results indicate that the percent subsidy – by capturing information both on the net price faced by a family as well as the potential financial benefits of coverage – better reflects the decision-making framework of exchange consumers than looking only at the out-of-pocket premium. This suggests, for example, that older individuals or those in areas with more costly health insurance are more likely to take up exchange coverage than younger individuals or those in cheaper rating areas, conditional on subsidies offering them a similar net premium.

Overall, the results in Table 5 are reassuring and demonstrate the robustness of the main findings in Table 3: moderate effects of the percent subsidy and Medicaid expansion to reduce the uninsured rate, a substantial woodwork effect, and negligible impact of the mandate.

V.E Results by Type of Insurance

Next, we decompose our findings on uninsurance into changes among different types of coverage, relying on the model with PUMA, year and income fixed effects shown in column (1) of Table 5. We consider three types of coverage: Medicaid, employer-sponsored insurance, and non-group private insurance. As discussed earlier, one difficulty with any such decomposition is that self-reported responses to insurance coverage questions may confuse different types of coverage. In particular, the wording of the ACS questions makes it quite reasonable for a respondent receiving subsidized exchange coverage to report either "Medicaid/government assistance plan" or "insurance purchased directly from an insurance company").

We show our results by type of coverage in Table 6. The first column shows the uninsurance results for comparison, while columns (2)-(4) show results by insurance type. The challenge with insurance classification is immediately apparent in the coefficient on percent subsidy in the Medicaid regressions, which is positive, suggesting that some individuals are reporting their publicly-subsidized exchange coverage as Medicaid. As expected, we find the largest effect of the premium subsidies on non-group insurance coverage. We estimate that each 10% rise in subsidy increases the share of the population with non-group insurance coverage by 0.29 percentage points. At the mean subsidy rate (16.2%) and the baseline non-group coverage rate (8.8%), this implies a small price elasticity of demand for non-group coverage of -0.05. This is much lower than the elasticity used in typical microsimulation modeling of the ACA (Gruber, 2011). If we treat the subsidy coefficients on Medicaid as part of the overall exchange effect, we estimate a larger elasticity – on the order of -0.09 - though still fairly inelastic.

We also find a small positive impact of the percent subsidy on employer-sponsored insurance coverage. Unlike the Medicaid question, which may reflect subsidized exchange coverage in some cases, it is difficult to plausibly attribute exchange coverage to an employer. If anything, employer coverage should be "crowded out" by these new subsidies. This suggests that miscoding of exchange coverage is offsetting any such crowd-out here.

The coefficient on the mandate penalty remains very small. For Medicaid, we do find a significant and positive effect; this estimate suggests that for every $100 in the average family mandate penalty, Medicaid enrollment rises by 0.03 percentage points, a very small effect. For both ESI and non-group, the mandate coefficient is wrong-signed but similarly small in magnitude as the Medicaid coefficient.

We estimate highly significant impacts of both Medicaid variables on Medicaid coverage. These coefficients essentially reflect marginal take-up rates among those eligible for the program. Among those made newly eligible in 2014, we detect a 9.2% take-up rate. Among those previously eligible, there is a 3.8% rise in coverage. Strikingly, these Medicaid effects are very close to the effects that we estimated for overall insurance coverage; that is, we estimate virtually no crowd-out of private coverage by the Medicaid expansion or woodwork effect. This is illustrated further in the next two columns of Table 6. We observe no negative impact of the Medicaid eligibility variables on either ESI and non-group insurance models (and in fact detect a significant but small *positive* effect on ESI of 0.005).

This is a notable finding, as most previous literature suggested at least some level of crowd-out was likely under the ACA. One previous coverage expansion without much crowd-out occurred in Massachusetts, suggesting that the individual mandate – a common element in

both scenarios – may play an important role here. Hackmann, Kolstad and Kowalski (2014) develop a model and empirical estimation to support this argument.

V.F Heterogeneity in Coverage Changes

We examine patterns of ACA effects across different demographic groups and states. To do so, we repeated our reduced form analysis for the following stratified samples. First, we assessed family type: single adults, married couples without children, and families with children. Then we assessed differences by race based on the race reported by the adults in each household: white, black, Latino, Asian, Native American, and Other. Then we assessed families based on the age of the adults, using 35 as the cut point between older and younger adults.

Next, we divided states into groups based on ACA-related policies. We compared states that had established their own State-based exchanges in 2014 to those using the federal exchange.[14] We also compared states based on their 2014 ACA Medicaid policies, classified into three groups – non-expansion states (n=24); states that choose to participate in the ACA's early expansion option by enrolling some childless adults between 2011 and 2013 (n=6, including Washington DC); and states that expanded eligibility in 2014 (n=21).[15]

In terms of family types (Table 7a), coverage gains associated with premium subsidies were largest for adult couples (ß=-0.067), as compared to single adults (ß=-0.062) and families with children (ß=-0.037). The 2014 effects of Medicaid eligibility were also largest in for adult couples, with take-up rates of over 13% for both previously-eligible and newly-eligible adults, while the comparable figures for single adults were 6.5% and 7.8%. Among families with

[14] The 14 states with state-based exchanges were CA, CO, CT, DC, HI, ID, KY, MA, MD, MN, NY, RI, VT, and WA. For 2016, Hawaii has reverted to the federal exchange.
[15] The 6 early expansion states are CA, CT, CD, MN, NJ, and WA. See Kaiser (2015) for list of other expansion states and timing.

children, the woodwork effect was smaller – 2.6% – while newly-eligible take-up was 10.9%. The lower woodwork numbers for families with children is consistent with two factors: 1) the very large number of children enrolled in Medicaid and CHIP prior to the ACA, in which they represented nearly half of the program's enrollment; and 2) the fact that Medicaid/CHIP take-up rates for children were already quite high and significantly above participation rates for eligible adults (Kenney et al., 2011).

One key factor that differs across these family types is age, with adult couples representing the oldest group on average (mean adult age = 51 years vs. 39 for single adults and 40 for adults in families with children). In our analyses stratified by the age of the adult(s) in each household, we do find larger coefficients for premium subsidies and Medicaid eligibility for older adults compared to younger ones. However, the age-related differences are smaller than those based on family type.

In analyses by race/ethnicity, we find significant effects of premium subsidies on uninsured rates for all groups except Native Americans. The coefficients were largest for Asians (ß=-0.099), followed by Hispanics (ß=-0.057), whites (ß=-0.046), and blacks (ß=-0.041). Meanwhile, all groups other than Native Americans experienced significant woodwork effects, ranging from 1.8 to 5.4%, again with Asians showing the largest coverage increases. All groups showed coverage gains associated with expansions in new Medicaid eligibility in 2014, with marginal take-up rates from 6.5% to 12.8%. Overall, we find inconsistent results as to whether ACA policies reduced coverage disparities, with whites experiencing larger coverage gains than blacks, but a mixed picture relative to Hispanics and Asians depending on the policy variable. Previous research has been similarly inconsistent, with some studies showing the largest coverage gains occurred in minorities groups (Chen, Vargas-Bustamante, Mortensen, & Ortega,

2016; Sommers, Gunja, et al., 2015), while others have found lower ACA participation among Hispanics (Blavin, Zuckerman, Karpman, & Clemans-Cope, 2014; Garcia Mosqueira, Hua, & Sommers, 2015). Meanwhile, consistent with another analysis of Native Americans (Frean, Shelder, Rosenthal, Sequist, & Sommers, 2016), we find that Medicaid expansion has been the primary driver for ACA-related coverage expansion.

In our analysis by state policy in Table 7b, we find that the exchange subsidies were much more effective at reducing the uninsured rate in states with state-based exchanges than in states using the federal exchange. Conditional on the size of the subsidy, take-up rates of exchange coverage were essentially twice as high in the state exchanges (ß=-0.080) as in the federal exchange (ß=-0.044). This may in part reflect the technical difficulties experienced during the launch of the federal website, though several of the state exchanges were plagued by similar challenges. More likely is that states that implemented their own exchanges were generally more consistent supporters of the coverage expansion effort, with greater outreach efforts and more support for application assistance via navigator programs and the like (Shin, Sharac, Zur, Alvarez, & Rosenbaum, 2014; Sommers, Maylone, Nguyen, Blendon, & Epstein, 2015). This interpretation is also consistent with the larger coefficients on the Medicaid policy variables in states with state-based marketplaces.

The pattern by Medicaid expansion decision showed some similarities, with larger effects of exchange subsidies evident in the states more supportive of the ACA (expansion states, particularly the early expansion states), and smaller effects in non-expansion states. In terms of the woodwork effect, we find particularly large changes in coverage in the early expansion states (ß = -0.063, vs. -0.028 in 2014 expansion states and -0.021 in non-expansion states). Taking into account the baseline share of each state's population and eligibility for Medicaid, this indicates

that approximately half of our estimated woodwork effect nationally is due to the 6 early expansion states (which account for 20% of the sample). This finding suggests that the early eligibility expansions from 2011-2013 laid the groundwork for increased Medicaid participation later on, and is also consistent with the notion that enrollment in expansions can take several years to reach steady-state.

V.G Falsification Testing

We also conducted several falsification tests using only pre-ACA data (2012-2013). Our identifying assumption is that our simulated policy measures by PUMA-income bands were not differentially correlated over time with our insurance outcomes before 2014. We tested this assumption directly by repeating the analysis from Table 6 with the sample limited to the years 2012-2013 and replacing the interaction terms between our independent variables of interests and *Year2014* with the comparable vector of interaction terms using *Year2013* instead. This essentially amounts to a "pre-trends" test – examining whether there is a similar pattern of effects comparing 2013 to 2012 that we get comparing 2014 to 2012/2013.

Table 8 presents these results for our four different insurance outcomes, using Models 1 through 3 from Table 5 (varying combinations of PUMA, year, and income fixed effects). Model 1, which only includes direct fixed effects for PUMA, year, and income group, shows several significant point estimates, though in all cases the absolute magnitude is small. For instance, the percent subsidy coefficient for uninsured in the falsification model is less than $1/8^{th}$ of the estimated 2014 effect, the previously Medicaid-eligible coefficient is roughly $1/5^{th}$, and the newly Medicaid-eligible is approximately $1/8^{th}$ the estimated 2014 effect. In Model 3, which adds income-year and PUMA-income fixed effects, only 1 of the 20 independent variables (5 for

each insurance outcome) is significant at $p<0.05$ or $p<0.10$ (again, a small coefficient on newly Medicaid-eligible, ß=0.010). These results offer strong support for our empirical approach.

VI. POLICY IMPLICATIONS AND CONCLUSIONS

In what we believe is the most comprehensive analysis to date of coverage changes under the ACA related to the law's numerous policy measures, we observe several notable results. First, we attribute roughly 37% of the ACA's reduction in the uninsured rate in 2014 to the creation of premium subsidies for exchange coverage. The other 63% is attributable to increased Medicaid coverage – but of that, the majority was in fact due to enrollment of previously eligible individuals. While some policymakers and researchers had anticipated this potential "woodwork effect," the fact that it is the single largest policy lever in the ACA's first year is somewhat surprising.

In part, this may reflect some measurement error in Medicaid eligibility, and if some share of our sample appeared eligible based on 2013 data but in fact was not eligible until 2014, this could bias our findings towards a larger woodwork effect.[16] However, an examination of administrative data on Medicaid enrollment from the federal government confirms that a substantial woodwork effect is plausible. Even in non-expansion states, Medicaid enrollment by January 2015 had increased by 8% over pre-ACA levels. In expansion states, of course, it had increased even more – by 26% – but our results suggest that a sizable portion of the gains in these states was in fact from the "woodwork effect" (CMS, 2014). Moreover, even among the childless adult group that comprises the bulk of the newly-eligible population under the ACA,

[16] Of course, the converse is also possible – our approach may define some individuals as ineligible in 2013 even though they were eligible. But these two mismeasurement effects are likely to be asymmetric, since the marginal take-up rate in 2014 among newly-eligible individuals should (and does) exceed the marginal take-up rate among previously eligible individuals. Essentially, mismeasurement of pre-ACA Medicaid eligibility should bias the woodwork coefficient upwards and the newly-eligible coefficient downwards.

CMS reported that as of late 2014 roughly 1/3 of this enrollment group was eligible under pre-ACA state Medicaid expansions (CMS, 2016).[17]

Another key finding is the lack of private insurance crowd-out. We find no evidence of significant crowd-out of employer-sponsored coverage by the new premium subsidies, and no evidence of crowd-out of either employer coverage or non-group private coverage by the Medicaid expansion. These are important results with implications for the efficiency of the ACA's insurance expansion and overall social welfare, as expanding coverage without crowding out alternative sources of health insurance reduces the law's total cost and potential deadweight loss (Gruber, 2008).

In terms of premium subsidies, our findings offer some useful insights for policy and future research. We find that modeling the net premiums is not a useful way to predict overall enrollment behavior, with coverage gains much more responsive to the percent subsidy received. By necessity, our model only examined a single representative premium in each market – the second lowest cost silver plan. Further research is needed into how consumers enrolling in exchange plans choose among their various options, in terms of the relative tradeoffs between overall subsidy rates, net premiums, and other plan features such as cost-sharing requirements and provider networks.

The fact that our calculated premium subsidy elasticities were fairly low hints at the uphill climb the law may face in continuing to build on the initial coverage gains of its first year. This likely reflects a combination of factors – the political firestorm about the law, ongoing confusion about many of its provisions, difficulties with state and federal websites, attempts by several states to limit the availability of so-called Navigators to assist consumers with the

[17] Massachusetts, due to its 2006 health reform law, and New York and Arizona, due to their large 2002-2003 expansions of Medicaid under Section 1115 waivers, were the largest contributors to this group in the CMS statistics.

application process, and perceived affordability concerns (Garfield & Young, 2015; Sommers, Maylone, et al., 2015). However, it should be noted that many previous insurance expansions in the U.S. – including the creation of the Children's Health Insurance Program in 1997 – took several years to reach steady-state and the ACA is likely to be no exception.

We find small and inconsistent effects of the individual mandate penalties in 2014. In part, this may indicate a lack of consumer awareness about the intricacies of the mandate tax penalty rules and various exemptions. It may also reflect the low levels of the mandate penalty in the law's first year. By 2016, the penalty will have increased substantially, up to 2.5% of taxable income or $695 per person, a roughly five-to-sixfold increase in size (Kaiser, 2013). Future research will be valuable to assess whether a penalty of this size produces additional changes in consumer behavior. Finally, it is likely that the mandate exerts a generalized effect that encourages people to obtain coverage in a way that is largely independent of the penalty's precise details and even whether one is subject to the mandate in the first place. In Massachusetts, for instance, researchers have shown an increase in Medicaid participation among adults after the implementation of the mandate, even though most had incomes too low to make them subject to it (Sonier et al., 2013).

While our parameterization of the ACA explains nearly 70% of the observed time trend in the data, we should note that the ACS itself likely provides an underestimate of the total coverage changes that occurred by the end of 2014, since the ACS is continuously fielded throughout the calendar year. Thus, the point estimates reported here reflect the average effect over the course of the year, and not the year-end results typically discussed in federal reports of ACA enrollment (ASPE, 2014). As national data become available for additional years of the

ACA's coverage expansions, how these patterns evolve over time will remain worthy of continuing study.

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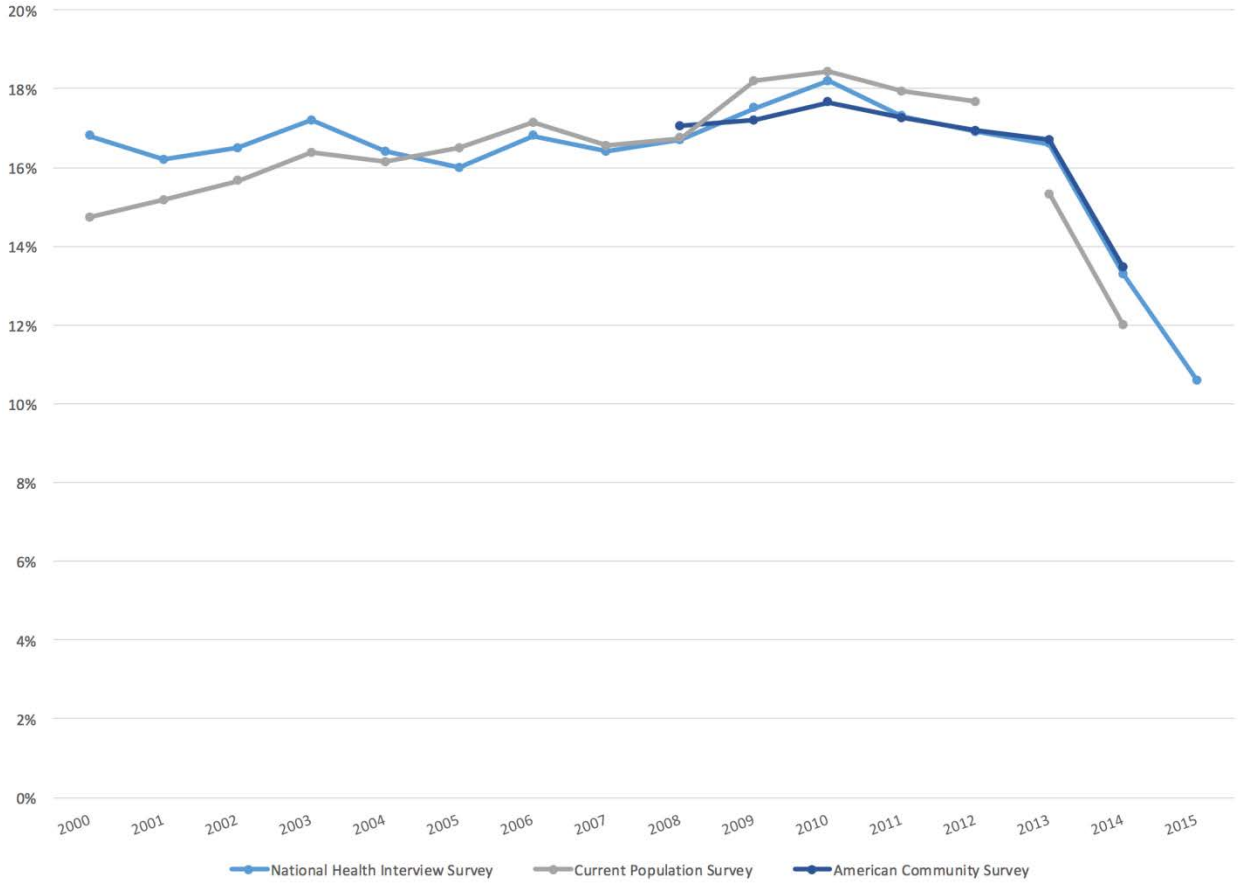
Tables and Figures

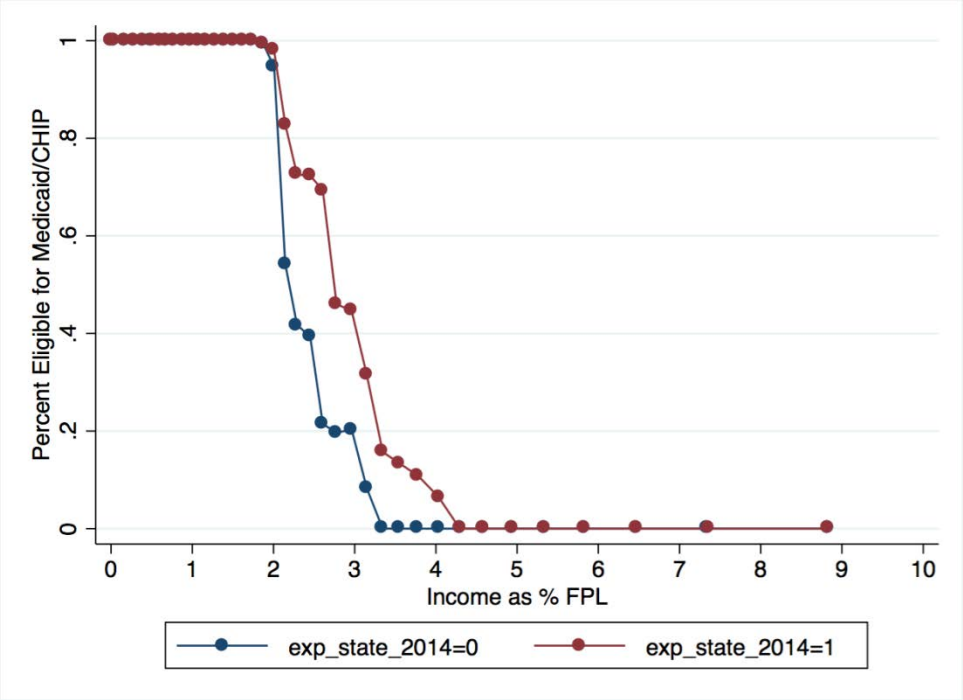
Figure 1. United States Uninsured Rate among Persons under Age 65, 2000-2015



Notes: Data are from two surveys conducted by the U.S. Census Bureau, the Current Population Survey (CPS) and the American Community Survey (ACS) and one conducted by the Centers for Disease Control and Prevention, the National Health Interview Survey (NHIS). The ACS only began collecting information on health insurance beginning in 2008. The break from 2012-2013 represents a break in trend from the redesign of the CPS' survey questionnaire.

Figure 2. Eligibility for Medicaid/CHIP by Income and Medicaid Expansion Status

Panel A. Child Eligibility



Panel B. Adult Eligibility

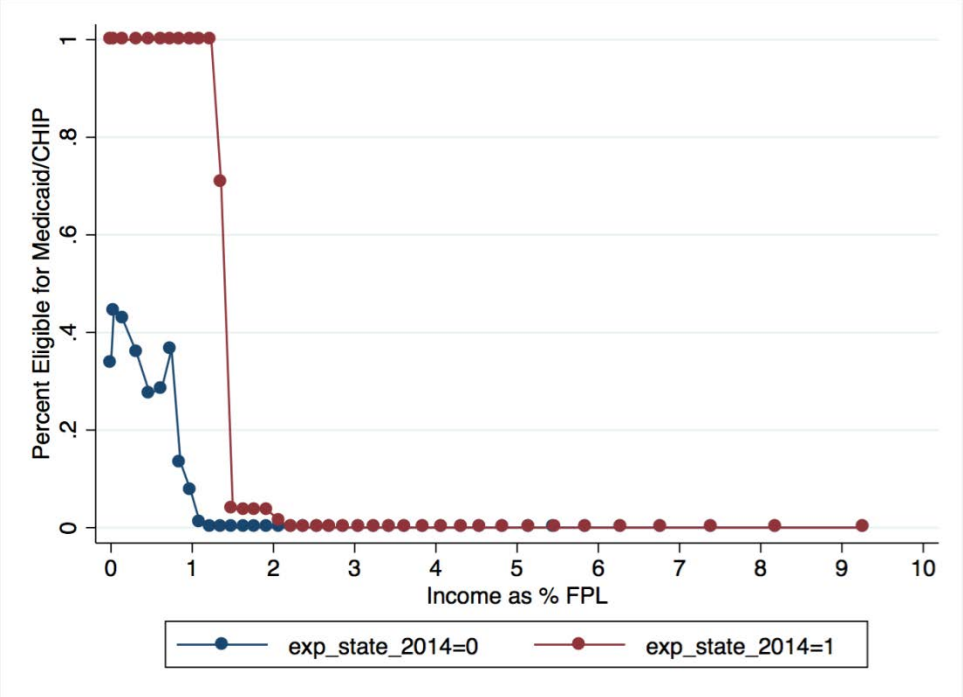


Figure 3. Exchange Percent Subsidy by Income & Medicaid Expansion Status

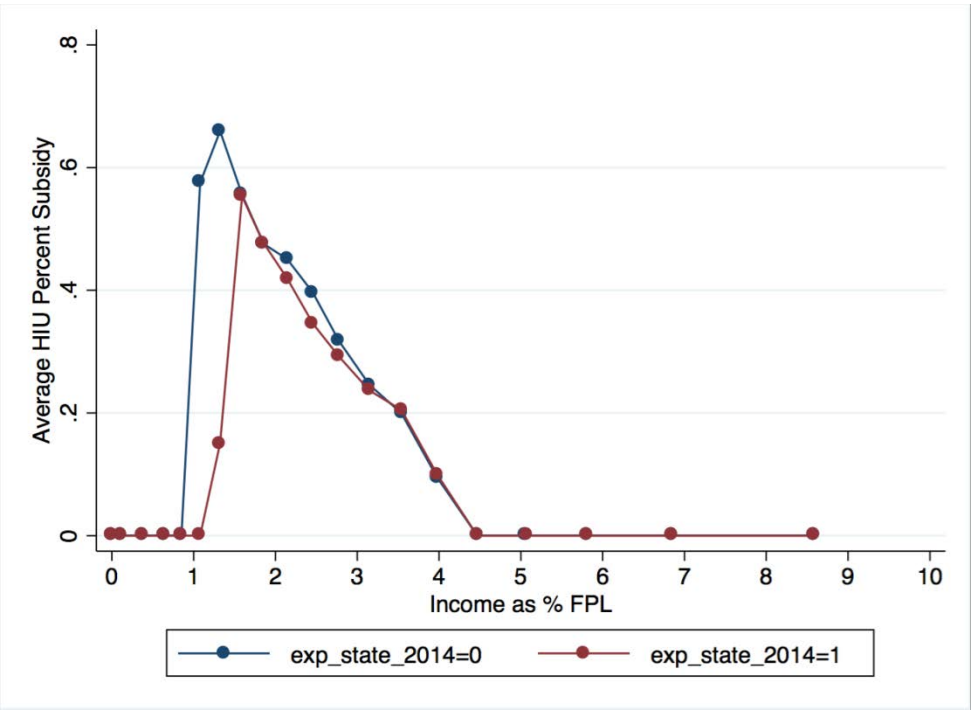
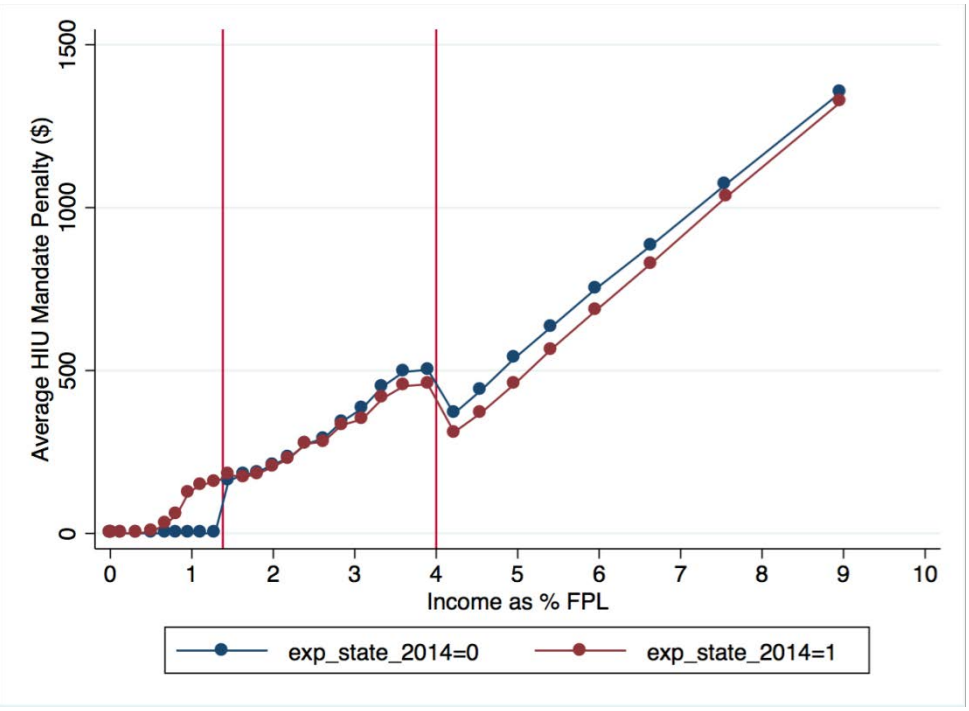


Figure 4. Individual Mandate Results by Income and Medicaid Expansion Status

Panel A. Average Mandate Penalty



Panel B. Percent of HIUs Subject to Mandate

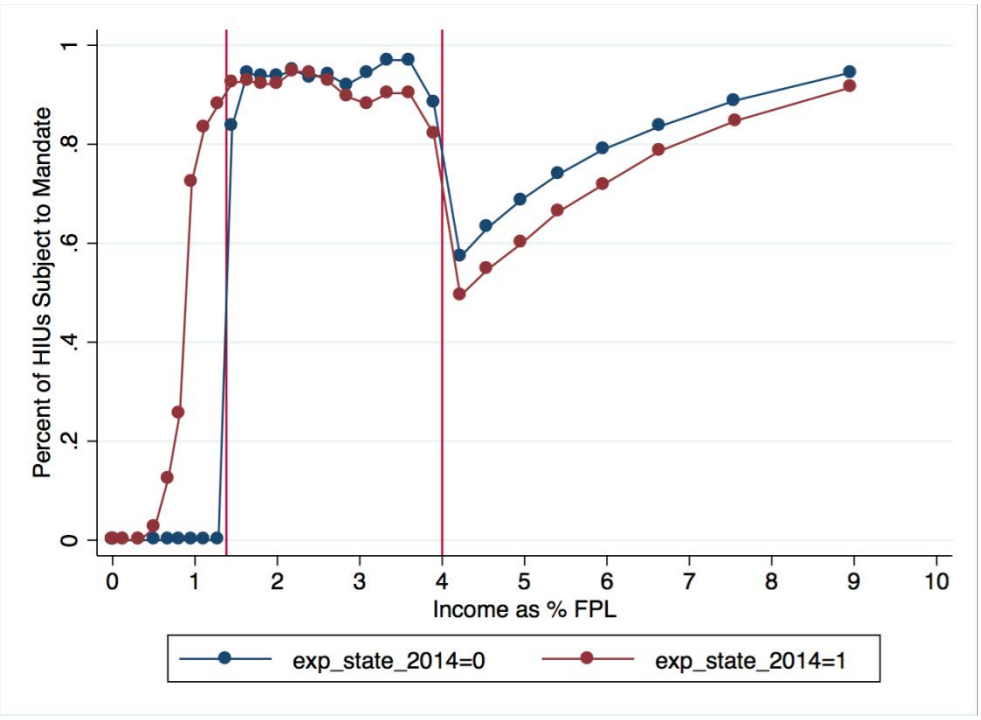


Table 1. Summary Statistics of Insurance Outcomes and Simulated Policy Variables in 2014

	Overall		Single Adults		Adult Couples		Families with Children	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Insurance Outcomes								
Uninsured	14.0%	31.7%	24.6%	43.1%	9.0%	26.1%	10.2%	24.6%
Medicaid	20.0%	36.8%	16.3%	36.9%	5.0%	19.2%	25.8%	38.8%
Employer Sponsored Insurance	58.7%	47.0%	49.1%	50.0%	74.6%	40.9%	59.1%	45.7%
Non-group Private	9.7%	27.6%	10.4%	30.5%	12.9%	31.0%	8.6%	24.9%
Medicaid Eligibility								
Percent Eligible based on pre-ACA criteria (2013)	24.8%	34.0%	14.6%	29.0%	2.5%	12.9%	35.7%	35.6%
Percent Newly Eligible in 2014	4.9%	18.4%	11.8%	29.9%	2.1%	14.0%	2.3%	8.9%
Individual Mandate								
Family Mandate Penalty	$458	$632	$207	$309	$600	$593	$542	$719
Subject to Mandate Penalty	63.7%	41.0%	59.2%	45.2%	70.0%	33.9%	64.3%	40.3%
Exchange Premiums								
Unsubsidized Family Premium	$8,023	$3,282	$4,078	$989	$10,266	$2,457	$9,350	$2,476
Net Subsidized Family Premium	$6,631	$3,488	$3,202	$1,509	$8,183	$3,908	$7,889	$2,867
Percent Subsidy	16.2%	24.4%	18.7%	28.9%	19.1%	30.0%	14.2%	19.8%

Table 2. Time Series Change in Insurance Outcomes by Family Type (2012-2014)

	2012	2013	2014
Overall			
Uninsured	17.5%	17.3%	14.0%
Medicaid	18.3%	18.5%	20.0%
Employer Sponsored Insurance	58.4%	58.1%	58.7%
Non-group Private	8.9%	8.6%	9.7%
Single Adults			
Uninsured	31.2%	30.3%	24.6%
Medicaid	13.4%	13.7%	16.3%
Employer Sponsored Insurance	47.5%	47.8%	49.1%
Non-group Private	8.7%	8.6%	10.4%
Adult Couples			
Uninsured	11.7%	11.8%	9.0%
Medicaid	3.7%	3.9%	5.0%
Employer Sponsored Insurance	75.1%	74.6%	74.6%
Non-group Private	11.5%	11.4%	12.9%
Families with Children			
Uninsured	12.6%	12.5%	10.2%
Medicaid	24.3%	24.6%	25.8%
Employer Sponsored Insurance	59.1%	58.7%	59.1%
Non-group Private	8.3%	7.8%	8.6%

Table 3. Reduced Form and IV Estimates for Percent Uninsured

	(1) 2-Stage Least Squares	(2) Reduced Form
Family Percent Subsidy * 2014	-0.055***	-0.052***
	(0.002)	(0.002)
Family Mandate Penalty * 2014 ($100s)	0.0002***	0.0001*
	(0.0001)	(0.0001)
Previously Medicaid-Eligible * 2014	-0.041***	-0.040***
	(0.002)	(0.002)
Newly Medicaid-Eligible * 2014	-0.090***	-0.088***
	(0.003)	(0.003)
Family Percent Subsidy	-0.011***	-0.010**
	(0.004)	(0.004)
Family Mandate Penalty ($1000s)	-0.004***	-0.004***
	(0.000)	(0.000)
Previously Medicaid-Eligible	-0.098***	-0.094***
	(0.004)	(0.004)
Newly Medicaid-Eligible	-0.030***	-0.028***
	(0.004)	(0.004)
Number of Adult Females	0.032***	0.012***
	(0.003)	(0.003)
Number of Adult Males	0.075***	0.053***
	(0.003)	(0.003)
Number of Children = 0		
Number of Children = 1	-0.327***	-0.314***
	(0.016)	(0.016)
Number of Children = 2	-0.347***	-0.345***
	(0.017)	(0.016)
Number of Children = 3	-0.363***	-0.367***
	(0.017)	(0.016)
Number of Children = 4	-0.382***	-0.386***
	(0.017)	(0.016)
Number of Children = 5 plus	-0.377***	-0.385***
	(0.017)	(0.016)
Family has Head of Household 1	-0.082***	-0.058***
	(0.004)	(0.004)
HoH1 Non-citizen	0.087***	0.088***
	(0.002)	(0.002)
HoH1 Age = Under 25	-0.027***	-0.020***
	(0.003)	(0.003)
HoH1 Age = 25-34	-0.009***	-0.005*
	(0.002)	(0.002)
HoH1 Age = 35-44	0.007***	0.012***
	(0.002)	(0.002)

HoH1 Age = 45-54	0.012***	0.018***
	(0.002)	(0.002)
HoH1 Age = 55-64	-0.017***	-0.011***
	(0.002)	(0.002)
HoH1 Age = 65 and above		
HoH1 Race/Ethnicity = White	-0.022***	-0.023***
	(0.001)	(0.001)
HoH1 Race/Ethnicity = Black	-0.03***	-0.031***
	(0.001)	(0.001)
HoH1 Race/Ethnicity = Asian	-0.022***	-0.022***
	(0.002)	(0.002)
HoH1 Race/Ethnicity = Native American	0.018***	0.021***
	(0.004)	(0.004)
HoH1 Race/Ethnicity = Other Non-Hispanic	-0.021***	-0.022***
	(0.002)	(0.002)
HoH1 Race/Ethnicity = Hispanic		
HoH1 Education = Less than High School	0.054***	0.053***
	(0.002)	(0.002)
HoH1 Education = High School Diploma	0.023***	0.023***
	(0.001)	(0.001)
HoH1 Education = College Graduate		
Family has Head of Household 2	-0.057***	-0.028***
	(0.004)	(0.004)
HoH2 Non-citizen	0.102***	0.103***
	(0.002)	(0.002)
HoH2 Age = Under 25	-0.029***	-0.021***
	(0.002)	(0.002)
HoH2 Age = 25-34	0.030***	0.034***
	(0.002)	(0.002)
HoH2 Age = 35-44	0.025***	0.027***
	(0.002)	(0.001)
HoH2 Age = 45-54	0.010***	0.013***
	(0.001)	(0.001)
HoH2 Age = 55-64	-0.017***	-0.013***
	(0.001)	(0.001)
HoH2 Age = 65 and above		
HoH2 Race/Ethnicity = White	-0.042***	-0.043***
	(0.001)	(0.001)
HoH2 Race/Ethnicity = Black	-0.036***	-0.036***
	(0.002)	(0.002)
HoH2 Race/Ethnicity = Asian	-0.059***	-0.059***

	(0.002)	(0.002)
HoH2 Race/Ethnicity = Native American	0.001	0.005
	(0.004)	(0.004)
HoH2 Race/Ethnicity = Other Non-Hispanic	-0.045***	-0.046***
	(0.003)	(0.003)
HoH2 Race/Ethnicity = Hispanic		
HoH2 Education = Less than High School	0.089***	0.089***
	(0.002)	(0.002)
HoH2 Education = High School Diploma	0.029***	0.032***
	(0.001)	(0.001)
HoH2 Education = College Graduate		

*Notes: HoH = head of household, defined as the one or two adults in each household; standard errors in parentheses; *p<0.10, **p<0.05, ***p<0.01*

Table 4. Projected Time Series Impact of Policy Variables in Percent Uninsured Model by State Expansion Status

	Reduced Form Coefficient	Population Mean (Simulated Measure)	Implied Percentage Point Change	Share of Total ACA-Related Change
	(1)	(2)	(3)	(4)
Family Percent Subsidy * 2014	-0.052	0.162	-0.85%	37%
Family Mandate Penalty * 2014 ($100s)	0.0001	4.58	0.05%	N/A
Previously Medicaid-Eligible * 2014	-0.040	0.248	-1.00%	44%
Newly Medicaid-Eligible * 2014	-0.088	0.049	-0.43%	19%

Table 5. Robustness to Alternative Specifications for Percent Uninsured

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Family Percent Subsidy * 2014	-0.052***	-0.053***	-0.033***	-0.025***	-0.054***		-0.054***
	(0.002)	(0.002)	(0.005)	(0.006)	(0.002)		(0.003)
Family Net Subsidized Premium * 2014 ($1000s)						0.0027***	-0.0002
						(0.0000)	(0.0002)
Family Mandate Penalty * 2014 ($100s)	0.0001	0.0001	-0.0008***	0.0005		0.0004***	0.0001*
	(0.0001)	(0.0001)	(0.0003)	(0.0004)		(0.0001)	(0.0001)
Subject to Mandate * 2014					0.0028*		
					(0.0016)		
Previously Medicaid-Eligible * 2014	-0.040***	-0.040***	-0.044***	-0.028***	-0.039***	-0.030***	-0.041***
	(0.002)	(0.002)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)
Newly Medicaid-Eligible * 2014	-0.089***	-0.088***	-0.076***	-0.059***	-0.089***	-0.075***	-0.089***
	(0.003)	(0.003)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
Year fixed effects	√	√			√	√	√
Income fixed effects	√				√	√	√
PUMA fixed effects	√				√	√	√
PUMA-income fixed effects		√	√				
Income-year fixed effects			√	√			
PUMA-year fixed effects				√			

*Notes: Standard errors in parentheses; *p<0.10, **p<0.05, ***p<0.01*

Table 6. Results by Type of Coverage

	(1) Uninsured	(2) Medicaid	(3) Employer Sponsored	(4) Non-group Private
Family Percent Subsidy * 2014	-0.052***	0.018***	0.009***	0.029***
	(0.002)	(0.002)	(0.003)	(0.002)
Family Mandate Penalty * 2014 ($100s)	0.0001	0.0003***	-0.0002	-0.0003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Previously Medicaid-Eligible * 2014	-0.040***	0.038***	0.005**	0.003*
	(0.002)	(0.002)	(0.002)	(0.002)
Newly Medicaid-Eligible * 2014	-0.089***	0.092***	0.002	0.002
	(0.003)	(0.003)	(0.003)	(0.002)

*Notes: Regressions in table include fixed effects from Model 1 described in Table 5; standard errors in parentheses; *p<0.10, **p<0.05, ***p<0.01*

Table 7a. Uninsured Results by Demographics

	Number of Observations (unweighted)	Family Percent Subsidy * 2014	Family Mandate Penalty * 2014 ($100s)	Previously Medicaid-Eligible * 2014	Newly Medicaid-Eligible * 2014
Overall	4,088,281	-0.052***	0.0001	-0.040***	-0.089***
		(0.002)	(0.0001)	(0.002)	(0.003)
Family Type					
Single Adults	1,937,828	-0.062***	0.0018***	-0.065***	-0.078***
		(0.004)	(0.0003)	(0.005)	(0.004)
Adult Couples	741,934	-0.067***	0.0008***	-0.136***	-0.136***
		(0.004)	(0.0001)	(0.011)	(0.010)
Families with Children	1,408,519	-0.037***	0.0001	-0.026***	-0.109***
		(0.004)	(0.0001)	(0.002)	(0.009)
Age of Adults					
Average Adult Age Under 35	1,422,474	-0.047***	0.0000	-0.039***	-0.075***
		(0.004)	(0.0002)	(0.003)	(0.005)
Average Adult Age 35 and Above	2,628,820	-0.054***	0.0002***	-0.046***	-0.100***
		(0.003)	(0.0001)	(0.003)	(0.004)
Race/Ethnicity of Adults					
White Head(s) of Household	2,573,440	-0.046***	0.0001	-0.036***	-0.096***
		(0.003)	(0.0001)	(0.002)	(0.004)
Black Head(s) of Household	504,108	-0.041***	0.0008**	-0.018***	-0.083***
		(0.006)	(0.0003)	(0.006)	(0.008)
Hispanic Head(s) of Household	534,732	-0.057***	-0.0003	-0.039***	-0.065***
		(0.007)	(0.0004)	(0.006)	(0.009)
Asian Head(s) of Household	183,630	-0.099***	0.0003	-0.054***	-0.075***
		(0.011)	(0.0003)	(0.007)	(0.014)
Native American Head(s) of Household	64,971	-0.001	-0.0038**	-0.028	-0.077***
		(0.025)	(0.0018)	(0.019)	(0.022)
Other/Mixed Race Head(s) of Household	190,413	-0.043***	0.0002	-0.039***	-0.128***
		(0.009)	(0.0002)	(0.007)	(0.016)

*Notes: Families without heads of household excluded from stratifications by race/ethnicity and age; regressions in table include fixed effects from Model 1 described in Table 5; standard errors in parentheses; *p<0.10, **p<0.05, ***p<0.01*

Table 7b. Uninsured Results by Geography

	Number of Observations (unweighted)	Family Percent Subsidy * 2014	Family Mandate Penalty * 2014 ($100s)	Previously Medicaid-Eligible * 2014	Newly Medicaid-Eligible * 2014
Overall	4,088,281	-0.052***	0.0001	-0.040***	-0.089***
		(0.002)	(0.0001)	(0.002)	(0.003)
Exchange Type					
State-Based	1,276,772	-0.080***	0.0001	-0.051***	-0.098***
		(0.004)	(0.0001)	(0.003)	(0.005)
Federal	2,811,509	-0.044***	0.0004***	-0.025***	-0.086***
		(0.003)	(0.0001)	(0.003)	(0.004)
Medicaid Expansion Status					
No Expansion	1,914,107	-0.034***	0.0005***	-0.021***	N/A
		(0.003)	(0.0001)	(0.003)	
Early Expansion in 2011-2013	845,590	-0.099***	0.0000	-0.063***	-0.085***
		(0.006)	(0.0001)	(0.003)	(0.007)
Traditional Expansion in 2014	1,328,584	-0.066***	0.0002**	-0.028***	-0.100***
		(0.004)	(0.0001)	(0.003)	(0.004)

*Notes: Regressions in table include fixed effects from Model 1 described in Table 5; standard errors in parentheses; *p<0.10, **p<0.05, ***p<0.01*

Table 8. Falsification Results by Type of Coverage

	(1) Uninsured	(2) Medicaid	(3) Employer Sponsored	(4) Non-group Private
Model 1 (year, income, PUMA fixed effects)				
Family Percent Subsidy * 2013	-0.006**	-0.002	0.013***	-0.004**
	(0.003)	(0.002)	(0.003)	(0.002)
Family Mandate Penalty * 2013 ($100s)	0.0003***	0.0000	-0.0002*	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Previously Medicaid-Eligible * 2013	-0.008***	-0.002	0.008***	0.004**
	(0.002)	(0.002)	(0.003)	(0.002)
Newly Medicaid-Eligible * 2013	-0.011***	0.011***	0.002	-0.001
	(0.004)	(0.003)	(0.003)	(0.002)
Model 2 (year, PUMA-income fixed effects)				
Family Percent Subsidy * 2013	-0.006**	-0.002	0.012***	-0.004**
	(0.003)	(0.002)	(0.003)	(0.002)
Family Mandate Penalty * 2013 ($100s)	0.0002***	0.0000	-0.0002	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Previously Medicaid-Eligible * 2013	-0.008***	-0.001	0.007***	0.003*
	(0.002)	(0.002)	(0.003)	(0.002)
Newly Medicaid-Eligible * 2013	-0.010***	0.010***	0.002	-0.002
	(0.004)	(0.003)	(0.003)	(0.002)
Model 3 (income-year, PUMA-Income fixed effects)				
Family Percent Subsidy * 2013	0.001	-0.004	0.005	0.000
	(0.006)	(0.006)	(0.007)	(0.004)
Family Mandate Penalty * 2013 ($100s)	0.0003	-0.0001	-0.0002	0.0005
	(0.0003)	(0.0003)	(0.0006)	(0.0005)
Previously Medicaid-Eligible * 2013	0.000	0.003	-0.001	-0.003
	(0.005)	(0.005)	(0.005)	(0.003)
Newly Medicaid-Eligible * 2013	-0.002	0.010**	-0.006	-0.004
	(0.005)	(0.005)	(0.005)	(0.003)

*Notes: Standard errors in parentheses; *p<0.10, **p<0.05, ***p<0.01*