*WORKING PAPER

# MEDICAID AS A SAFETY NET: DOES MEDICAID GENEROSITY MITIGATE THE EFFECTS OF UNEMPLOYMENT DURING ECONOMIC DOWNTURNS?

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ABSTRACT

The Great Recession of 2008-2009 was characterized by accelerated unemployment rates and decreased insurance rates—in particular, decreased rates of employer-sponsored health insurance coverage. In times of economic uncertainty, Medicaid could act as a safety net to allow households to address their immediate health care needs and potentially mitigate some of the more severe effects of the recession. However, access to Medicaid coverage—even if used as a temporary source of coverage—can vary greatly based across states. We explore the value of Medicaid coverage among those who transition to Medicaid from other coverage during times of economic downturn. This shadow benefit has the potential to apply to 70% of the US population with employer-sponsored health insurance coverage. Using two large and nationally representative databases, we find that, during the recession, residents of states with more generous Medicaid eligibility limits for Medicaid experienced increased Medicaid participation during the recession and were less likely to report losing access to a regular source of care. Residents in states with the most generous Medicaid eligibility policies self-reported significantly better health status, following the recession than residents in states whose policies were less generous. These results suggest that elevated Medicaid limits provides protections during periods of temporary enrollment, while can potentially stabilizing household finances. The study's findings shed new information about the value of Medicaid to relatively healthy, recently unemployed adults who need temporary assistance.

## INTRODUCTION

The most recent national financial crisis, the Great Recession of 2007 to 2009, exposed U.S. households to elevated joblessness (Elsby, Hobijn et al. 2010), housing foreclosures (Posner and Zingales 2009), and financial bankruptcies—particularly due to health care costs (Himmelstein, Thorne et al. 2009, Himmelstein, Thorne et al. 2011). During this time, rising unemployment resulted in a national-level decline in employer sponsored health insurance (ESHI) coverage—falling from 63.4 percent in 2007 to 58.6 percent in 2010 (Gould 2012). In addition to the financial strain of unemployment, this loss of health insurance coverage deals a massive blow to households' financial health due to high out-of-pocket costs associated with immediate demands for health care, such as chronic disease management (Cook, Dranove et al. 2010). During this same period, Medicaid enrollment grew faster than it had prior to the recession (Smith, Gifford et al. 2010). This accelerated uptake in public health insurance participation suggests that some individuals who lost access to private coverage due to joblessness were able to maintain access to coverage and health care by enrolling in Medicaid (Snyder and Rudowitz 2016).

When considering the returns to investments in Medicaid, the discussion among academics and policymakers have weighed gains in access and health status among perpetual vulnerable and medical-needy populations against direct costs of providing care to those populations and crowd-out effects from people who elect Medicaid coverage (Allen, Baicker et al. 2010), in lieu of private coverage. The extent to which people substitute Medicaid for private insurance is considered inefficient from a social planner's perspective because Medicaid is intended to be an insurer of last resort. Our study contributes to this discussion about the value of Medicaid coverage to individuals with employer-sponsored health insurance as a safety-net program. This group of potential

enrollees are short-term Medicaid recipients whose ability to re-enter the workforce may be contingent on maintaining access to the health care system (Stewart 2001).

While Medicaid's role as a source of coverage for low-income adults and children is well-known in the literature, we know less about the value of Medicaid for those *'at risk'* of becoming poor or losing access to private coverage because of unanticipated unemployment or a considerable change in one's economic circumstances. We should expect that, as a safety net program, participation in Medicaid increases during an economic downturn; however, variation in state's Medicaid eligibility guidelines can make it easier or more difficult for some households to turn to Medicaid as an alternative source for health care coverage. In times of uncertainty when households may have few other resources to afford needed medical care, continued access to health care is expected to stabilize household consumption and mitigate the adverse health effects of a recession.

In this study, we use data from the Great Recession to identify the access, utilization, and self-reported health impact of Medicaid during economic downturns. Due to data limitation, we are unable to observe changes in insurance status at the individual level, therefore, our results are reflective of Medicaid enrollment among the recently unemployed (who previously had ESHI) and of enrollment among individuals previously eligible. This latter source of enrollment across states, however, is expected to be constant, whereas the enrollment among the recently unemployed varies with state Medicaid eligibility guidelines. We use this variation to investigate the extent to which the generosity of state Medicaid programs provided any identifiable protections from the hurtful impacts of the recession on several measures of health and economic well-being (e.g. uninsurance, foregone medical attention, elevations in poor health status). We find that generous eligibility criteria increased reports of sustained access to care and excellent self-report health status. This

effect is monotonically increasing in terms of local levels of unemployment. These findings establish that Medicaid is an effective insurer of last resort for households losing access to private health insurance coverage during an economic downturn, with significant improvements household health care access and utilization. To the best of our knowledge, this work is the first to consider heterogeneity in the adverse health effects of the recessions due to variation in 'potential' access to Medicaid coverage.

## BACKGROUND

### *Financing Medicaid Coverage*

At present, Medicaid provides health insurance coverage to 68 million low-income adults and children (Centers for Medicare & Medicaid Services 2017), and the challenge of the Medicaid program, from a financial planning standpoint, is that its spending is not managed by a top-down approach. In other words, both the state and federal governments are liable for any expenses incurred by Medicaid enrollees, even if the amount of submitted claims exceeds predicted program allotments. At the state level, policymakers can make mid-year adjustments to slow the rate of Medicaid spending: implementing managed care, reducing elective services, limiting eligibility among non-federally-mandated groups, or adjusting physician payments. At the federal level, there are no similar policy levers that can be adjusted to slow Medicaid spending; the federal government pays a share of total expenditures generated from the state's design of the Medicaid program.

Federal guidelines identify mandatory poverty levels at which infants and pregnant woman must be eligible for Medicaid, defining the minimum eligibility at the extensive margin. However, states are allowed to increase the covered poverty level and extend coverage to other groups of low-income adults, such as parents of Medicaid-eligible children. This is the level of variation we

will exploit in this study. If the states could establish that such extensions would be budget neutral, permission to extend coverage was obtainable via a Section 1115 waiver. In the mid-to-late 1990s, states used savings from managed care to fund such increases in eligibility generosity (Rudowitz, Artiga, and Arguello 2013). We observe in our data that most states that filed these waivers in the 1990s were ranked as the most generous in terms of Medicaid eligibility a decade later, just prior to the Recession of 2008. The relative consistency in the ranking of generous eligibility guidelines is discussed in more detail in the Data section.

The second dimension of Medicaid generosity is the breadth of covered services among the Medicaid-eligible population ("intensive margin"). Just prior to our period of interest, several states broadened the span of their Medicaid-eligible population at the extensive margin (i.e. expanding categorical access to Medicaid coverage to childless adults) in ways that reduced the generosity of their programs at the intensive margin (i.e. raising the levels of upper-income limits) via the Health Insurance Flexibility and Accountability (HIFA) Demonstration Initiative (Atherly, Dowd et al. 2012). The critique of the HIFA program was that the groups not federally mandated would be unable to meaningfully access services if cost-sharing were increased, there were enrollment waitlists, or if key services were excluded from the package of benefits (Coughlin, Long et al. 2006). The HIFA waivers and their implications on pre-recession coverage rates provide an important context to our findings and more importantly the internal validity to our study; however, we argue this variation in pre-recession policy implementation is not perfectly correlated with our measure of state's relative *positions* of Medicaid generosity.

Recently, concerns over the federal cost of the Affordable Care Act's (ACA) Medicaid expansions yielded a proposal to switch the federal government's share of Medicaid funding from a match rate corresponding to state expenditures to a block grant program (Chatterjee and

Sommers 2017). Block grants would stabilize federal Medicaid spending by providing fixed, per-capita allotments to the states, shifting the risk of overspending to state governments (Posner and Wrightson 1996). Critics of the block-grant approach have argued that block grants undermine states' ability to respond to rapid changes in population health (e.g. epidemics) or medical innovations (e.g. availability of specialty drugs), or to absorb the adverse effects of changes in the economy (Lambrew 2005). Without the ability to increase expenditures, state governments may respond to unexpected changes in Medicaid demand or costs by reducing eligibility, such as restricting access for short-term unemployed households. This study aims to inform such policy discussions by quantifying the effects of recession-induced enrollment, providing a basis for determining the value of this safety-net function.

***Medicaid's Value to Individual Households***

The Medicaid-eligible population is a dynamic group, shifting across eligibility categories and over time. Between 25 and 50 percent of Medicaid enrollees experience income changes that affect their Medicaid eligibility (Sommers, Graves et al. 2014, Koetting 2016). As a result, a significant segment of people "churn" between eligibility and ineligibility; individuals eligible for Medicaid in January may be deemed ineligible at the 3-month redetermination mark if they gain employment, but then become eligible again before the end of the year if there is a change in the number of hours worked. As a result, the size of a state's Medicaid-eligible population can fluctuate within each year (Sommers and Rosenbaum 2011, Sommers, Tomasi et al. 2012).

Research also suggests that the states' costs associated with individual enrollees can swing dramatically. Examining trends in Medicaid per capita spending persistence between 2002 and 2004, (Coughlin and Long 2009) find that, among the Medicaid patients that incurred the top 5

percent of expenditures, 2 percent of moved to the bottom spending group in 2003 to 2004, and 0.5 percent of the enrollees who incurred the lowest spending in 2002 moved into the top 5 percent in the following years. These changes at the extensive margin (in terms of eligibility) and at the intensive margin (in terms of per capita spending) have not been mitigated by the use of managed care (Perez 2017). Therefore, the extent to which states can predict Medicaid expenditures from previous years is limited by uncertainty about health shocks and the composition of Medicaid enrollees. Periods of economic instability further complicate this dynamic, adding to states' uncertainty regarding expenditures.

At the household level, the literature demonstrates that health insurance coverage increases financial security. Himmelstein et al. (2009) find that more than 60 percent of declared bankruptcies in the U.S. were due to medical debt; over 90 percent of the filings were debts exceeding $5,000 (Himmelstein, Thorne et al. 2009). In a nationwide study, Gross and Notowidigdo (2011) estimate that a 10 percentage point increase in Medicaid eligibility reduced bankruptcy filings by 8 percent (Gross and Notowidigdo 2011).

For many households, enrollment in Medicaid could have reduced accumulation of financial liabilities during the economic downturn, and recent study of the 2014 Medicaid expansion find evidence that Medicaid coverage reduces the likelihood of accumulating medical debt and the use of short-term, high-interest financing mechanisms (Hu, Kaestner et al. 2016, Dillender 2017). Expanded Medicaid coverage under the ACA in California led to a reduction in high interest borrowing (e.g., "payday loans"), suggesting that the expansion had an even broader impact on debt reduction by reducing dependence on these services (Allen, Swanson et al. 2017). Mazumder and Miller (2016) find that Massachusetts' health care reform—particularly the individual coverage mandate—led to a reduction in medical debt and resulted in other indicators

of financial security such as eroded bankruptcy filings and higher credit scores (Mazumder and Miller 2016). However, health insurance did not fully offset financial strain from medical expenses; difficulty paying medical expenses still contributed to nearly 53 percent of bankruptcies filed in Massachusetts, even after full implementation of the state's health reform (Himmelstein, Thorne et al. 2011).

Therefore, medical costs remain a central factor in household-level financial health, and Medicaid eligibility is likely to have significant effects on household financial security during periods of financial stress such as economic downturns. While states may seek to limit Medicaid eligibility during these periods, in order to contain costs, the collective impact on households could have the undesired effect of slowing financial recovery from a recession and ultimately damaging the economic productivity of the state.

## METHODS

Based on the authors' data analysis, uninsured rates increased during the recession period, potentially disrupting access to health care. As households are expected to seek to restore lost coverage, we anticipate observing increases in Medicaid participation among households affected by job loss, to the extent that a given state's Medicaid eligibility permits able-bodied adults under 65 to enroll. Given the variation in state eligibility for this group, we expect uptake in Medicaid coverage during the recession to be comparatively larger among states with more generous Medicaid programs, which we define as those with wider categorical classifications determining eligibility or elevated income limits. Accordingly, we expect declines in access to care to be flatter (i.e. declining more slowly) in states whose Medicaid eligibility rules extend to a larger segment of their residents.

***Empirical Approach***

Medicaid enrollment is a poor measure of Medicaid generosity because enrollment is the share of eligible individuals who apply to the Medicaid program. Generosity is the share of the population eligible to enroll. Thus, first source of bias introduced by using enrollment as a measure of generosity is participation bias. There may be unobservable differences between individuals eligible for coverage who do not enroll and eligible individuals who do enroll; the most likely characteristics being immediate health status. Individuals who are sick are more likely to have an encounter with the health care system and, if they go to a hospital, hospital administrators will help patients enroll in Medicaid.

Medicaid enrollment is also a poor measure of Medicaid eligibility because eligibility criteria are endogenous. Medicaid eligibility for adults 19 to 64 is determined at the state-level and may be a product of state population demographics and health insurer characteristics. For example, prior to the ACA, in 2013, the median income in Maryland was $72,500. In Mississippi, the median income was $38,000. Thus, any maximum-income Medicaid eligibility criteria would apply to a larger share of the population in Mississippi, relative to Maryland. Further, differences in employer-based coverage also affect the proportion of people potentially eligible for Medicaid, given any state threshold. The state with lowest employer-sponsored health insurance rate (ESHI) among adults 19-64 was in New Mexico (49%), whereas New Hampshire had an ESHI rate of 71%.

States have a multitude of policy levers to stabilize state-level macroeconomic shocks. For example, mid-year adjustments to tax rates and mid-year budget cuts to social welfare programs are implemented to avoid incurring unplanned deficits. These state actions may also affect

household decisions to take up Medicaid. Factors that destabilize a state economy may also simultaneously affect the demand for Medicaid. The exit of a major employer from a state represents both a loss of tax revenue to the state and a loss of jobs among households. Therefore, single-state case studies of Medicaid enrollment on healthcare access following a state-specific macro-economic shock would be biased. The direction of the bias is ambiguous.

To address the endogeneity of Medicaid enrollment and Medicaid generosity, we use a simulated measure of Medicaid generosity based on a nationally-representative sample (See Data section). We then use the Great Recession as an external shock to state economies to evaluate the effect of the generosity in a natural experiment setting. The Great Recession was a downturn that imposed shocks on all state economies in magnitudes that were larger than typical state shocks; unemployment rates during the Recession were twice the rate of the pre-Recession unemployment level. Further, individual households could not perfectly smooth consumption because the start and end of its occurrence was uncertain. The moniker "Great Recession" was attributed to the period of 2007 to 2009 to signify that is was the largest national downturn since the "Great Depression" of 1929.

Our study design utilizes both a standard difference-in-differences framework and a flexible difference-in-differences regression framework. Both models exploit variation in the relative generosity of states' Medicaid programs and the timing of the recession. Our first set of regressions utilizes the timing of the "peak" point of the recession and is detailed below:

$$Y_{ist} = \alpha + \delta_1 Interim_t + \delta_2 PostCrisis_t + \gamma_1(MiddleThird_s \times Interim_t) + \gamma_2(UpperThird_s \times Interim_t) + \gamma_3(MiddleThird_s \times PostCrisis_t) + \gamma_4(UpperThird_s \times PostCrisis_t) + \lambda_1 StateUnemploymentRate_{st} + \lambda_2 StateUnionMembership_{st} + \Gamma X_{ist} + \sigma_s + \tau_t + \varepsilon_{ist} \quad (1)$$

We delineate three temporal segments within our study period: 1) *pre-recession*, covering years 2004-2007; 2) *interim financial crisis*, for years 2008-2009; and 3) *post-financial crisis*, covering

2010. In addition to comparing impacts across time, we are comparing across Medicaid programs by level of generosity at the state level. Our comparison group under each framework are state Medicaid programs in the lower third of generosity with the smallest share of a nationally representative population with simulated Medicaid eligibility for 2007.

To fix our understanding about states falling into one of the three levels of generosity, we provide Figure 1. In the lower third of states, the median percent eligible for Medicaid among those 18 states was four percent with a range of 2.8 to 5.6 percent eligible. In the middle category, the median was 6.6 percent eligible ranging from 5.8 to 10.8 percent. In the upper third (i.e. most generous) category of Medicaid generosity, the median was 16.4 percent with a range from 11.5 to 37.3 percent in 2007. $MiddleThird_s$ is a dummy variable signifying an observation resides in one of the states whose Medicaid program is in the middle third of generosity, and $UpperThird_s$ signifies an observation being from a state whose program is among the more generous.

$Interim_t$ is a dummy variable indicating a household being observed during the recession period, and $\delta_1$ provides the change in the mean of the outcome for those living in the lower third (least generous) of states regarding Medicaid generosity. $PostCrisis_t$ is a dummy variable to indicate a household being observed in the period just after the recession, and $\delta_2$ characterizes the changes in the outcomes mean occurring among the least generous Medicaid eligibility states between the pre-recession period (i.e. 2004-2007) and the post-recession period (i.e. 2010). $\gamma_1$ captures the effect of being in the middle third of states (i.e. "average" generosity) during the recession, and $\gamma_2$ captures the effect of being in the upper third (i.e. most generous) states regarding generosity for Medicaid eligibility. Whereas $\gamma_1$ and $\gamma_2$ are the policy parameters that would tell us if there are any protective effects due to Medicaid generosity during the recession, $\gamma_3$ and $\gamma_4$ are the parameters that would indicate if there are any protective effects extending into the post-

recession period. We anticipate that close inspection of the $MiddleThird_s \times PostCrisis_t$ and $UpperThird_s \times PostCrisis_t$ terms can help determine whether access to Medicaid coverage could have played a role in recovery from the recession.

Household-level controls reflected in $X_{ist}$ are: age of the survey respondent (19-26 [reference group], 27-44, 45-64), gender, marital status, number of own children living in the household, race/ethnicity (White/Non-Hispanic [reference group], Black/Non-Hispanic, Other/Non-Hispanic, and Hispanic/any race), and level of education (i.e. less than a high school diploma, high school diploma or its equivalent, some college/technical school, and BA/BS or higher [reference group]). To adjust for differing economic and health indicators that vary based on the state of residence, we include a vector of state-level fixed effects ($\sigma_s$), and to control for secular changes in national economic and health status, we include period-specific fixed effects ($\tau_t$). In our regressions using the CPS-ASEC, $\tau_t$ takes the form of a year fixed-effect and allows us to control for time-varying differences in the levels of the outcome specific to each year. In the BRFSS analyses, $\tau_t$ is a calendar month fixed-effect allowing us to control for more subtle fluctuations in the outcomes of interest due to unobservable monthly changes in the macroeconomic climate.

The Great Recession did not have uniform impact on state unemployment nationally, and these differences in state-level unemployment can be interpreted as treatment intensity. We thus test the sensitivity of our results to these intensity by using state unemployment levels as a measure of the potential demand for Medicaid coverage. This approach contributes a related literature on the responsiveness of health insurance coverage to changes in the macro-economic condition of the state. We present the following regression specification as our attempt to capture heterogeneity

in the response to changes in the state's unemployment rate based on the state's relative level of Medicaid generosity:

$$Y_{ist} = \alpha + \gamma_1 StateUnemploymentRate_{st} + \gamma_2(MiddleThird_s \times StateUnemploymentRate_{st}) + \gamma_3(UpperThird_s \times StateUnemploymentRate_{st}) + \Gamma X_{ist} + \sigma_s + \tau_{st} + \varepsilon_{ist}. \quad (2)$$

The regression specification in equation (2) allows us to assess individual-level response patterns to changes in the states unemployment rate—the strongest indicator of state-level economic insecurity based on previous research (Cawley and Simon 2005). In this approach, the effect of rising unemployment among states in states with more restrictive Medicaid eligibility policies is captured by $\gamma_1$. The extent that a rise in the unemployment rate among states in the middle and upper (i.e. more generous) thirds of Medicaid generosity deviates from the pattern among states in the lower third is captured by $\gamma_2$ and $\gamma_3$. When the outcome studied is the individual's insurance coverage status (i.e. uninsured), for example, we anticipate the sign on $\gamma_1$ to be positive, thus indicating a positive correlation between the likelihood of being unemployed and rising unemployment rates. Should residence in a state with more generous Medicaid eligibility provide a protective effect from the effect of unemployment on being uninsured, then we anticipate the signs on $\gamma_2$ and $\gamma_3$ to be negative, because we hypothesize a one-percentage point rise in the unemployment rate will have differential effects based on potential access to an alternative source of health insurance.

Key to our difference-in-differences regression strategies is the identifying assumption that in the absence of variation in the generosity of the states' Medicaid programs, the outcomes' trends would have continued to be parallel to one another across the three generosity groups because all would have been impacted the same by the recession. Additionally, we assume that states' positions in the distribution regarding Medicaid generosity are stable across time, and were not impacted by the timing of the recession. While it is plausible that states could roll back certain provisions of Medicaid coverage during times of fiscal stress (Rudowitz and Marks 2008), research

by Perez et al. suggests this did not occur during the most recent recession (Perez, Benitez et al. 2018). States periodically make subtle changes to their Medicaid upper-income limits that can result in a larger (expansions) or smaller (contractions) share of the population being eligible for Medicaid participation; in this case, potential policy endogeneity would become a concern if several states were to either raise or lower their Medicaid income limits in response to the recession. To avoid this issue, we categorize states based on their pre-Recession (i.e. 2007) levels of generosity to avoid simultaneity bias in the results estimations.[1]

Using each of the two surveys for our study have benefits as well as limitations. For example, using the CPS-ASEC we track uptake in Medicaid coverage across states as well as compare changes in levels of private (e.g. employer sponsored) health insurance coverage. One limitation with our use of the CPS is we are unable to link variation in access to Medicaid coverage to changes in health outcomes as we do in the BRFSS. Even though analysis of the CPS allows us to produce more targeted evaluations of the effect of potential access to Medicaid coverage on take-up, we anticipate our results could be downwardly biased because of well-known undercounts of Medicaid coverage based on CPS estimates in comparison to enrollment data (Call, Davidson et al. 2008, Davern, Klerman et al. 2009, Pascale, Roemer et al. 2009, Call, Davern et al. 2013). Our analysis of Medicaid coverage trends with the CPS allow us to establish the first-order effects necessary to draw valid conclusions from our analysis of the health effects in the BRFSS data. Health insurance coverage status in the BRFSS is broadly defined and only indicates if the respondent has health insurance coverage "of any kind," so we can only assert variation in access

[1] The tercile structure of state's generosity describes eligibility generosity prior to the Recession and, rather than the states' specific *levels* of generosity, the key determinant for Medicaid access is the state's *position* in the generosity distribution. During the study period, states rarely transitioned between the three generosity levels, based on our data. Among the 17 states categorized in the upper third (more generous) in 2007, two had moved to the middle third of generosity by 2010, and just one had moved to the lower third (less generous) by 2010. Among the 18 states in the lower third, 15 were still in the lower third of generosity by 2010, two had moved to the middle, and one had moved to the more generous category by 2010.

to Medicaid coverage had any effects on health outcomes during the recession based on the results obtained from analyzing the CPS. Without the ability to determine uptake in Medicaid coverage specifically, our analyses of variation in access to Medicaid coverage represent intent-to-treat (ITT) effects because using the BRFSS, for example, we cannot ascertain that differential responses in the outcomes to the recession and rising unemployment rates were driven precisely by differential increases in Medicaid participation (Pischke and Angrist 2009). In spite of our ability to more clearly isolate the pathway by which changes in health outcomes could occur with our data, we argue the policy relevance of our findings are clear. Medicaid eligibility limits are determined at the state-level by policy makers, and empirical evidence consistent with our hypotheses may provide an indication of the broader implications of Medicaid programs with expanded eligibility (Dillender 2017, Wherry, Miller et al. 2017).

***Data***

*1. Current Population Survey*

We utilize a special version of the 2005 to 2011 Annual Social and Economic Supplement to the Current Population Survey (CPS-ASEC) developed by the Integrated Public Use Microdata Series (IPUMS) group at the University of Minnesota (Flood, King et al. 2016). The CPS-ASEC, also known as the March supplement to the CPS, inquires about a person's health insurance coverage status, household income, and employment status for 486,693 individuals. These questions pertain to the previous calendar year; therefore, the 2005-2011 CPS-ASEC surveys correspond to calendar years 2004-2010. Because survey respondents indicate their source(s) of coverage for the span of an entire year, it is possible that adults in our sample will simultaneously

report having some form of private insurance as well as public health insurance coverage in the past year.

To classify states along lines of Medicaid generosity, we first used income data from the CPS-ASEC to calculate the fraction of a nationally representative sample of non-elderly pregnant women, parents of minors, and infants that would have been eligible in each state for Medicaid coverage based on that state's rules in 2007 based on household income (just prior to the recession's onset). This step in our strategy draws from studies using simulated Medicaid eligibility to estimate the effects of early Medicaid and Children's Health Insurance Program (CHIP) expansions (Yelowitz 1995, Cutler and Gruber 1996, Lo Sasso and Buchmueller 2004, Gruber and Simon 2008, Seiber and Florence 2010, Muhlestein and Seiber 2015, Sabik, Tarazi et al. 2017). The second step involved separating the states into quantiles based on their relative Medicaid generosity. In contrast to the previous studies using the simulated Medicaid eligibility measure, which used an instrumental variable design, we use the measure to determine each state's position regarding Medicaid generosity and "potential" access to Medicaid coverage. That is, if a larger share of the adult sample was eligible for Medicaid, then we considered the state more generous; conversely, if a smaller share was eligible, then we considered the state less generous due to its restricted access to Medicaid coverage. Previous studies have used the actual enrollment in Medicaid to study the effects of the Recession on insurance coverage or changes in health outcomes among Medicaid enrollees. To allow for better interpretability regarding a state's relative level of Medicaid generosity, we grouped the states into thirds based on their position within the distribution (i.e. terciles). Under this scheme, states in the upper third of the distribution were categorized as "more generous," and states in the lower third as "less generous" in their Medicaid programs.

We also used the CPS to model changes in source(s) of coverage during the previous year.[2] Specifically, we model whether the survey respondent was uninsured or had some form of other coverage during some point in the analytical period. The outcomes of interest are 1) if the respondent was uninsured at any point in the past year, and 2) if they had one or more of the following sources of health insurance coverage: Medicaid, private health insurance coverage of any kind, employer sponsored health insurance (ESHI) coverage of any kind, ESHI under their name (i.e. they are the owner of the plan and receive it through their employer), and ESHI received as a dependent beneficiary.

*2. Behavioral Risk Factor Surveillance System*

The Behavioral Risk Factor Surveillance System (BRFSS) is a large, nationally representative survey conducted by the Centers for Disease Control in partnership with state departments of health that has a sample size of 924,526. The objective of the BRFSS is to monitor patterns in health status, health care utilization, and behavioral health risks. The BRFSS also contains a variable regarding health insurance coverage status (i.e health insurance coverage of any kind). Other measures in the BRFSS include: (1) unmet medical needs due to cost in the past year (i.e. cost-related barriers to seeking health care), (2) having a regular source of medical care, (3) having scheduled doctor visitation for a check-up within the past year, and (4) self-reported health status.

Both the BRFSS and CPS-ASEC feature variables that enable us to make inferences regarding the effect of the recession on health insurance coverage. However, analyses of each

[2] Coverage, income, and thus eligibility items in the Annual Social and Economic Supplement (ASEC) of the CPS are 'look-back' variables, therefore the 2005 wave of the ASEC indicates the observation's eligibility status for 2004.

survey require different interpretations. The BRFSS questions participants about their coverage status at the time of participating in the survey, thus we treat the results as a "point-in-time" estimates of the effects of the recession. Conversely, the CPS-ASEC summarizes the events occurring over the previous year, so we are able to measure Medicaid coverage using this extended window, which is particularly advantageous given the degree of churning in the Medicaid program and that some Medicaid participants may only utilize Medicaid benefits on a temporary or conditional basis (Marton and Yelowitz 2015).

*3. State-Level Macroeconomic Data*

State-level unemployment rates are obtained from the most recent version of the Area Health Resource File (Health Resources and Services Administration 2016), and serve as our key measure of variation in the macroeconomic climate. Changes in unemployment rates are used to make inferences about the health effects of recent recessions (Cawley and Simon 2005, Cawley, Moriya et al. 2015, Ruhm 2015, Gordon and Sommers 2016, Hollingsworth, Ruhm et al. 2017). We also obtained data on the share of the adult workforce that is unionized from (Hirsch and Macpherson 2017). We include this measure among our control variables because union presence could have a positive effect on generosity and access to private coverage plans even in times of financial downturn. While Cawley and Simon (2005) utilized this control variable in earlier work for a similar justification, they found its inclusion was weakly correlated with changes in health insurance coverage status (Cawley and Simon 2005) and omitted its inclusion in follow-up studies (Cawley, Moriya et al. 2015). Due to the nature of the sampling, we are unable to control for individual fixed effects as in studies by Cawley and Simon (2015) and Cawley et al. (2015); instead, we elect to include the unionization variable in our models in order to more fully capture

changes in the macroeconomic environment that could be correlated, even if only weakly, with changes in coverage type and access to care.

## RESULTS

To understand the effects of the recession on Medicaid program enrollment, Figure 1 presents the trends in unemployment across the CPS and BRFSS samples by states' 2007 levels of generosity in Medicaid coverage. Unemployment trends across the three state generosity categories were similar prior to the recession. In the year before the recession, a slight divergence in unemployment rates is visible, which widens over the length of the recession. States with the most generous levels of Medicaid coverage demonstrated the largest increases in unemployment.

Further, while the main source of identification for this study is differences in Medicaid eligibility criteria, the descriptive differences among states in each of the terciles is noteworthy. Table 2 presents the sample characteristics of states by their level of generosity. Relative to the other groups, states in the lower third of Medicaid generosity had a larger share of African-American households than did the other states. States with the lowest levels of generosity are disproportionately located in the South; states with the most generous Medicaid eligibility guidelines pre-recession were located in the Northeast and Northwest. States in the lowest tercile of Medicaid generosity also had lower levels of higher education and income than states in the highest tercile. With exception to African-American representation and geographic distribution, the observable sub-sample characteristics based on levels of generosity of the state of residence are roughly comparable to one another in both the CPS-ASEC and the BRFSS. Furthermore, the characteristics appear comparable to one another across each survey, thus signaling the likelihood that are results characterize the same target population of non-elderly adults.

The estimated effect of generosity on health-related measures depends on the assumption that generosity levels are correlated with observed enrollment. Figure 2 presents the trends in the source of health insurance coverage by state's relative level of Medicaid generosity from 2004 to 2010. There is no visible difference in private health insurance enrollment trends among generosity groups. Higher rates of Medicaid coverage and lower overall levels of uninsurance were more common among states with the highest levels of enrollment generosity, both pre- and post-recession. While the common trend was that increased Medicaid participation was occurring in all states, increasing participation rates appear sharper among states with more generous Medicaid programs.

To link Figure 3 presents the trends in selected health utilization and access to health care measures in the BRFSS by state's relative level of Medicaid generosity from 2004 to 2010. States with the least generous Medicaid eligibility were generally more limited in terms of access to care (measured as having a regular source of care and having scheduled a doctor's visit) and the highest rates of unmet medical need due to cost throughout the study period. Inversely, states with the highest Medicaid generosity had higher rates of access according to these measures and the lowest rates of unmet medical need among the three terciles. The most notable increase in these gaps was seen in the measure of having a regular source of care during the recession. However, these differences in access and utilization did not correspond to trends in health outcomes (Figure 4), which did not differ significantly among the generosity terciles.

Table 3 presents the regression results analyzing changes in the source of health insurance coverage, following equation (1) using data from the CPS-ASEC. Rates of uninsurance and public insurance increased over the study period. Uninsurance increased by 1.23 percentage points during ($p<0.10$) and by 1.32 points among residents in the least generous states—about a seven percent

increase in uninsurance off a base of 19 percent in 2007. The trend changes were fairly comparable for states in the middle and upper thirds of generosity, signaling increased uninsurance was common across all states as implied in figure 1. We reiterate that results using the CPS-ASEC act as a summary account for a person's coverage status in the year, rather than at the time the survey was completed. Our interpretation of these findings leads us to conclude increases in the likelihood that someone experienced at least *temporary* uninsurance during the past increased in correspondence with the timing of the recession.

Subsequently, we find increased participation in Medicaid occurring across all groups; however, relative to the changes in Medicaid coverage rates for those in the least generous states, the uptake was substantively larger in the middle and upper third of states were and significant below the 5 percent level. Following the recession, the difference in Medicaid enrollment was 65 percent larger in the upper-third generosity states, relative to the middle-third of states. Across the board, it appears reductions in private health insurance coverage were common, and heterogeneity in potential access to Medicaid coverage did little to affect this pattern (see Table 3, columns 3-6).

Given the similar levels of coverage between the bottom and middle tercile, relative to the middle and top tercile, as a sensitivity check, we estimate the results by measuring Medicaid generosity as a binary indicator equal to one if the state ranks in the top quartile of Medicaid generosity and as a continuous measure (Table A1). These alternative specifications document a similar increase in uninsurance rate in the sample due to declines in ESHI, though mitigated by increased Medicaid coverage in states with relatively high eligibility generosity.

Table 4 presents the effects of Medicaid generosity on measures of insurance, utilization, patient access, and self-reported health status from the BRFSS. Column 1 presents the effects on the probability of being insured at the time of the survey. The point estimates are not statistically

significant at the 5 percent threshold until we see residents of states in the upper third of generosity were more likely to have coverage of some kind than their counterparts in the lower third in the period immediately following the recession (Column 1, Table 4). Although the share of reported unmet medical need due to cost increased by 4 percent during and following the recession, there was no significant difference in trends across levels of Medicaid generosity (column 2). The regression results indicate a decline in the share of people reporting a regular source of medical care, but the standard errors are too noisily estimated to be significant (column 3). Individuals in states with Medicaid generosity in the middle and upper terciles reported significantly higher rates of a regular source of medical care than individuals in states in the lowest tercile of Medicaid generosity (0.9 and 1.4 percentage points, respectively; column 3). There were no consistent patterns of difference in terms of Medicaid generosity and the proportion of respondents who scheduled a doctor's visit for a check-up (column 4).

Next, we assess the effects of Medicaid generosity on self-reported health status. The interaction between Medicaid generosity and recession indicators are positive, but only significant when measuring the share of individuals reporting high levels of physical health. Compared to respondents in states with the lowest levels of Medicaid generosity, respondents in states with the highest level of Medicaid generosity were more likely to report excellent health (1.2 percentage points, column 1) and excellent/very good health (1.3 percentage points, column 2). The differences between Medicaid generosity over the course of the recession do not present statistically significant patterns in terms of days of poor physical or mental health (columns 9 and 10, respectively) or the number of days when activity was limited due to poor health (column 11).

Table 5 reflect the results using the regression framework outlined in equation (2), and are presented using linear probability models. A one percentage point increase in the state

unemployment rate corresponds to a 0.45 percentage point increase in the likelihood of reporting uninsured ($p<0.01$) among states in the lowest category of Medicaid generosity. There was no difference in the trend for the middle third of states; however, as unemployment rose in the upper third of states, individuals were less likely to report being uninsured (-0.21 percentage points, $p<0.05$) than their counter parts in the lower third of states. This is reinforced in column 2 of the table 3. We observe that for every one point increase in unemployment, residents of states in the middle and upper third of states were 0.16 points ($p<0.05$) and 0.31 points more likely to have taken-up Medicaid at some point in the previous year.

The effect of unemployment on uninsurance using the BRFSS is nearly identical to that using the CPS-ASEC (see Table 6). A one percentage point increase in the state unemployment rate corresponds to a 0.33 percentage point increase in the likelihood of reporting uninsured ($p<0.05$) among states in the lowest category of Medicaid generosity. As unemployment rose in the upper third of states, individuals were less likely to report being uninsured (-0.25 percentage points, $p<0.01$) than their counter parts in the lower third of states. In spite of this enhanced access to an alternative source of health coverage among states in the more generous states, increases in households' ability to afford needed medical care was exacerbated by rising unemployment (0.46 percentage points, $p<0.01$). Subsequently, we see no variation in the likelihood that individuals across each group of states experienced financial barriers to seeking medical care, having a regular source for medical care, or in scheduled checkups. However, we observe evidence suggesting individuals in the more generous states may have experienced some protection in maintaining positive levels of health status.

As unemployment rises, the share of people reporting in positive (i.e. good, very good, and excellent) health falls. This trend is consistent with the rationale that changes in the economy, as

measured by unemployment, reduce access to care and increase other stressors. In columns 7 and 8, people were 0.21 percentage points less likely ($p<0.05$) to report in positive health and increasingly likely to report in fair or poor health (0.21 percentage points, $p<0.05$). However, people in the highest category of health status (i.e. excellent health) did experience some protective effect, relative to residents in more restrictive states, from residing in states with more generous programs.

Estimating effects by race and gender generates three observations of note related to disparate access. First, both the samples in CPS and BRFSS demonstrate higher rates of uninsurance during and after the Recession (Figures A3 and A4). Second, the marginal gains in Medicaid coverage were twice as large in magnitude between non-Hispanic White and Black/Hispanic respondents in states with the highest of Medicaid generosity (Figure A5). Third, Black or Hispanic women reported statistically significant rates of unmet medical need due to cost during and after the Recession; Black or Hispanic men only reported statistically significant rates of such unmet medical need during.

Estimating effects by demographics related to age and education also generates observations of note (Figure A5). Both samples from the CPS and from the BRFSS indicate higher uninsurance rates for college-educated women during and following the Recession, but not among college-educated men. In states with the highest levels of Medicaid generosity, these college-educated men and women reported significantly higher Medicaid coverage during the Recession and in the year after its official conclusion, though takeup was higher among individuals reporting a high school degree equivalent or less education. Medicaid generosity in the middle and top terciles of the eligibility distribution appeared to help individuals between the ages of 19 to 26; in the top tercile, individual between the ages of 27 and 44 also reported significant gains.

## DISCUSSION

The analysis yields three key takeaways. First, Medicaid generosity mitigated insurance loss that followed change in state unemployment levels. This effect was monotonic across levels of state Medicaid generosity. This relationship between unemployment and Medicaid enrollment is not a foregone deduction, though it is a reasonable syllogism as Medicaid can provide the lowest cost alternative available to recently unemployed individuals. If, however, recently unemployed individuals' demand for ESHI was highly inelastic, even in the face of an uncertain period of reduced income, individuals could continue their private coverage via the Consolidated Omnibus Budget Reconciliation Act (COBRA).[3] During the Great Recession, the American Recovery and Reinvestment Act of 2009 provided substantial subsidies for COBRA benefit; Moriya and Simon (2016) use this credit to estimate responses to this credit and find employees fairly price inelastic with respect to private health insurance (Moriya and Simon 2016). Therefore, the observed increase in Medicaid enrollment, in response to changes in unemployment is an economically significant finding.

Second, Medicaid generosity stabilized access to a regular source of medical care during the recession. These results suggest that Medicaid is an effective element of the safety net for newly unemployed individuals who might otherwise lose their regular source of medical care. These results likely underestimate the value of generous Medicaid coverage among individuals with ESHI because take-up of Medicaid coverage is often a fraction of the eligible population.

[3] COBRA allows recently unemployed workers can purchase the group health benefits plan previously offered by their former employer for up to 18 months, following termination. These laws have been shown to reduce the loss of private insurance by 3 percentage points among recently unemployed workers in the mid-1990s Gruber, J. and B. C. Madrian (1997). "Employment separation and health insurance coverage." Journal of Public Economics **66**(3): 349-382.

Unable to observe the fraction of adults taking up Medicaid coverage, we cannot differentiate the effect of Medicaid generosity on people newly Medicaid eligible due to job-loss and on people who only recently chose to enroll (i.e. "Woodwork" or "Welcome-Mat" effects).

Third, there was a persistent effect of higher self-reported health status in states with higher Medicaid generosity following the recession and changes in the state unemployment rate. This relationship is particularly notable because states with the highest Medicaid generosity were also the states that experienced the largest increases in unemployment rates. This difference in self-reported health status did not closely align to differences in reported access or utilization, which is consistent with studies that suggest financial stability (such as the stability conferred by health insurance coverage) has a significant positive effect on self-reported health status.

The simulated eligibility distribution excludes three sources of variation in eligibility rules: eligibility among childless, non-elderly adults, marital status of adults, and asset tests. If eligibility was extended to childless adults in states in the middle and lowest terciles of generosity, this exclusion biases our results towards a non-effect. If eligibility was extended to childless adults in the highest tercile, then the point estimate overestimates the effect of generosity among the included sample and, instead, represents the benefits of generosity among a broader set of non-elderly adults. Excluding marital status means that presumes a stricter set of eligibility guidelines to household income than what is applied in practice for couples where only one spouse is applying for Medicaid benefits, typically for long-term care. The Spousal Impoverished Act allows the non-applicant spouse to retain a share of household resources above the federal poverty threshold, excluding its value from the applicant spouse's resources. If lower eligibility among pregnant women, parents of young children, and infants is correlated with lower allowances for household income and assets, then our estimates of Medicaid generosity likely overstate the effect of

generosity among the selected group alone, instead representing the benefits of broader forms of generosity. These omissions are the result of data limitations, but do not invalidate the findings. The results indicate a positive return in healthcare access and self-report health status when eligibility is extended to higher-income groups that may only need the program during temporary economic downturns.

In this study, we characterize Medicaid generosity among a select population of non-elderly adults and infants as a proxy for safety-net coverage among groups with slightly higher income than federal guidelines (in the case of infants and pregnant women) and group who are not mandated as part of the Medicaid program (in the care of non-elderly parents of minor children). Recent changes to health insurance laws under the Affordable Care Act raise questions about the generalizability of our results in the current healthcare system. For example, the dependent care coverage provision allows adults under 27 years old to obtain coverage through their parents' private insurance plan. However, the specific enrollment window of the provision limits the extent to which this provision insures against unforeseen changes in employment and insurance status. Similarly, defined enrollment windows for Marketplace enrollment limits the extent to which the value of Medicaid coverage is changed for those who unexpectedly lose their private coverage due to economic downturn.

This study does not address the returns to Medicaid generosity at the intensive margin, which likely affects the health status indicators. To the extent that participation in HIFA is reflective of variation in intensive margin generosity, we find HIFA-participating states in the lowest, middle, and highest terciles of the extensive margin distribution. Most of the early participating HIFA states in Coughlin (2006) were ranked in the highest tercile of Medicaid generosity in this study, 6 of those 8 states had pre-HIFA waivers that were fairly constant over

the study period (Rudowitz, Artiga et al. 2013). Thus, this trend would bias us towards a null result only if the intensive margin generosity affected access to health care that mattered for self-reported health status, not measures of Medicaid coverage or primary care, which was a universally included service.

Although earlier work has established that eligibility rules do not shift in response to the recession, one possible concern about our analysis is that states with high Medicaid generosity prior to the Recession reduced outreach efforts during the Recession to reduce costs. If states ranked as generous based on stated eligibility rules reduced outreach efforts, then their effective eligibility may be overestimated relative to states ranked lower based on stated eligibility rules. We supplement our analysis with a survey of spending data from the CMS Expenditure Reports, 2001-2010, that report spending by Medicaid service line. High spending on Medicaid enrollment brokers, outreach efforts, and eligibility outstations is expected to increase enrollment. We find that changes in these areas of spending are not concentrated among a single tercile over each period; further, states ranked in the top tercile of generosity increased their outreach spending during and after the Recession (Figure A1). Further, we find persistent trends in tax revenue collections from 1991 to 2006 among states by their ranked generosity group in 2007, which substantiates the assumption that generosity observed in 2007 was a temporary increase due to short-term changes in revenue (Figure A2).

Our findings have implications for addressing disparities in health and health care utilization. Relative to the other categories of Medicaid generosity, a disproportionate share of the population in the least generous states are African-American and largely located in the U.S. South. Higher levels of household financial insecurity were linked to worse employment outcomes following the recession, and Southern residents were shown to have the disproportionately high

levels of economic vulnerability both during and prior to the recession (Hacker, Rehm et al. 2010, Hacker, Huber et al. 2011). At baseline—and already seen as an economically insecure group as a whole, a large share of African-Americans were disadvantaged in their ability to access a resource shown to provide substantial protection from poverty and bankruptcy (Gross and Notowidigdo 2011, Sommers and Oellerich 2013, Hu, Kaestner et al. 2016, Allen, Swanson et al. 2017). The Great Recession further worsened the financial standing of African-Americans relative to Whites (Kochhar and Fry 2014, Thiede and Monnat 2016). We observe differences in the effects of generosity by race, age, and education, implying that Medicaid generosity can mitigate disparate exposure to disparate access to ESHI (Bertrand and Mullainathan 2004). Future research may consider the potential impacts of variation in access to Medicaid coverage during this period on the wealth inequality gap and the duration of some households' ability to recover from the recession.

## CONCLUSION

Medicaid has a valuable place in the social safety net to offer households temporary relief from bearing the full burden of financing medical care in periods of economic downturn. At the macro-level, as unemployment rises, states suffer from losses in tax revenue while demand for Medicaid coverage increases. To adhere to short-run budget constraints, states may be inclined to reduce Medicaid generosity. However, reductions in access to Medicaid may reduce household financial stability and increase the use of high-interest, short-run loans to access health care, potentially prolonging economic instability in the state. This study establishes that generosity in Medicaid program design can stabilize access to a regular source of care at a time of substantial shifts in private insurance access. Positive effects of Medicaid generosity are also observed on

self-reported health. Given these first-order gains in health and access, there may be significant second-order effects of Medicaid generosity that relate to the speed of the recovery of the state's economy, but this is an area for future work.

This research contributes to the current debates about Medicaid financing —not only in debates on whether states should expand, but the implications of expanded Medicaid programs in times of economic uncertainty. Benefits of the Medicaid program usually focus on the longer-term support the program provides for populations that cannot gain coverage through private channels. Related discussions on cost containment involve limiting access to only these populations, to avoid incurring the cost of individuals with access to private insurance ("crowd-out"). However, our findings demonstrate the short-term benefits the program provides among those temporarily in need of coverage. In the short-run, and by acting as a safety net program, Medicaid likely offered some relief to many households experiencing joblessness due to increasing economic instability associated with the Great Recession. Medicaid programs with generous eligibility rules helped households maintain continuity in health insurance coverage, experience some continued access to care, in spite of reductions in private coverage, and experience some protections from falling into poor health status.

The Medicaid program's current financing structure wherein the federal government matches states' expenditures allows these programs to more readily absorb new demand for Medicaid coverage because the federal and state governments share the cost of unforeseen enrollment increases during times of economic downturn. It is difficult to conceive of a block grant arrangement that would encourage efficiency and savings among the anticipated portion of Medicaid-eligible individuals, such as federally mandated groups, without reducing the value of the program to the temporarily uninsured during times of economic recession, as described in this

study. Furthermore, our study suggests that states should weigh the potential costs of crowd-out against the benefits that accrue to temporarily needy populations.

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TABLES & FIGURES

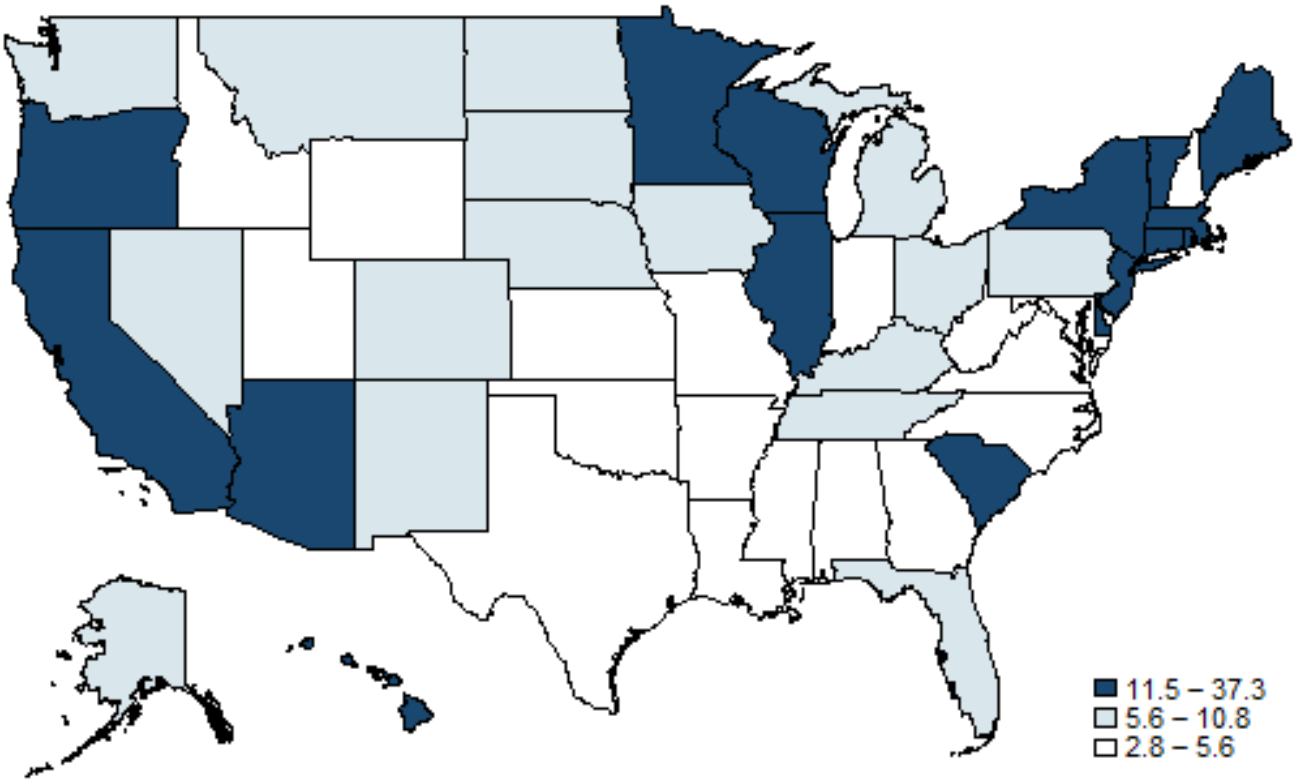



**Figure 1. States by Relative Generosity of their Medicaid Programs based on 2007 Percent with Simulated Medicaid Eligibility for Non-Elderly Adults.**

Source: Authors' own analysis of the IPUMS version of the Annual Social and Economic Supplement of the Current Population Survey (CPS-ASEC), 2008

Note: States in the upper third of Medicaid generosity (i.e. more generous) had a median percent eligible for Medicaid of 16.4 and included: AZ, CA, CT, DC, DE, HI, IL, MA, ME, MN, NJ, NY, OR, RI, SC, VT, and WI. States in the middle third included: AK, CO, FL, IA, KY, MI, MT, ND, NE, NM, NV, OH, PA, SD, TN, and WA (median percent Medicaid eligible = 6.6). States in the lower third (i.e. least generous) had a median percent Medicaid eligible of 4.0 percent and included: AL, AR, GA, ID, IN, KS, LA, MD, MO, MS, NC, NH, OK, TX, UT, VA, WY, and WV.

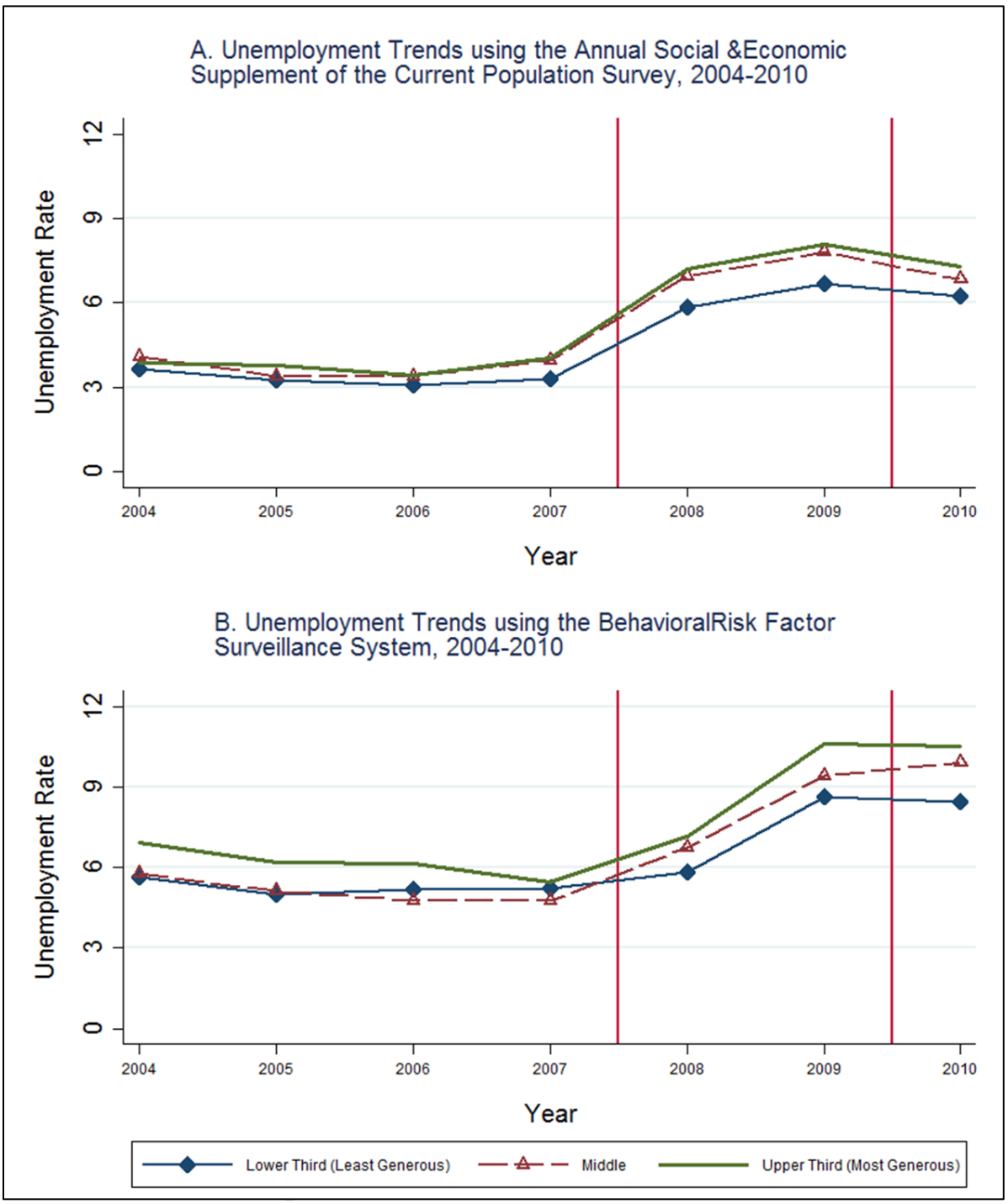



**Figure 1. Trends in Unemployment Rates by Data Source, 2003-2010**

Source: Authors own analysis of the IPUMS version of the Annual Social and Economic Supplement of the Current Population Survey (CPS-ASEC), 2005-2011 [Panel A] and Behavioral Risk Factor Surveillance System (BRFSS), 2004-2010 [Panel B].

Note: All graphics represent unadjusted trends among non-elderly adults aged 19-64. Median percent eligible for Medicaid across the three groups is as follows: 1) Lower third [4.0%], 2) Middle third [6.6%], and 3) Upper third [16.4%]. The interim recession years are 2008-2009, and 2010 indicates the post-recession period. Results from the CPS-ASEC capture if one was unemployed at any point during the calendar year, while results from the BRFSS capture one's employment status at the time of the survey.

**Table 2. Baseline Characteristics by State's Relative Level of Medicaid Generosity.**

| | Lower Third | | Middle Third | | Upper Third | |
|---|---|---|---|---|---|---|
| | CPS-ASEC | BRFSS | CPS-ASEC | BRFSS | CPS-ASEC | BRFSS |
| Age | 40.8 | 40.6 | 41.4 | 41.2 | 40.8 | 40.6 |
| Female | 52.1% | 49.7% | 51.6% | 49.5% | 51.7% | 49.4% |
| Married | 60.4% | 65.1% | 58.6% | 63.7% | 56.9% | 60.1% |
| Racial/Ethnic Group | | | | | | |
| White, Non-Hispanic | 67.0% | 68.4% | 76.8% | 76.7% | 62.4% | 61.7% |
| Black, Non-Hispanic | 16.0% | 14.0% | 9.4% | 8.0% | 9.1% | 7.8% |
| Other Race, Non-Hispanic | 4.6% | 6.0% | 4.5% | 5.9% | 9.9% | 9.3% |
| Hispanic (Any Race) | 12.4% | 11.5% | 9.4% | 9.4% | 18.6% | 21.1% |
| Number of Children in Household | 0.9 | 1.0 | 0.9 | 0.9 | 0.9 | 1.0 |
| Educational Attainment | | | | | | |
| <High School Completion | 13.2% | 10.4% | 10.0% | 7.6% | 12.4% | 11.2% |
| High School Diploma or Equivalent | 31.5% | 28.4% | 33.4% | 29.7% | 27.3% | 24.3% |
| Some College/Technical School | 29.2% | 27.2% | 29.9% | 28.9% | 29.0% | 26.9% |
| BA/BS or Higher | 26.1% | 33.9% | 26.7% | 33.9% | 31.3% | 37.6% |
| Total Household Income (Continuous) | $68,942 | --- | $69,657 | --- | $78,253 | --- |
| Total Household Income (Categories) | | | | | | |
| <$20,000 | 17.8% | 16.4% | 16.8% | 14.0% | 16.1% | 16.9% |
| $20,001-$50,000 | 30.3% | 37.2% | 29.5% | 37.9% | 27.2% | 32.2% |
| >$50,000 | 51.8% | 46.4% | 53.7% | 48.1% | 56.7% | 50.9% |
| Geographic Region of U.S. | | | | | | |
| Northeast | 1.4% | 1.4% | 14.4% | 14.5% | 34.9% | 34.2% |
| Midwest | 15.8% | 15.9% | 32.6% | 32.9% | 20.2% | 20.1% |
| South | 78.1% | 78.1% | 32.4% | 31.9% | 4.8% | 4.8% |
| West | 4.7% | 4.6% | 20.6% | 20.6% | 40.1% | 40.8% |
| Observations | 148,112 | 316,388 | 143,926 | 329,306 | 194,655 | 278,832 |

Source: Authors' own analysis of the 2005-2008 Annual Social and Economic Supplement of the Current Population Survey (CPS-ASEC) and 2004-2007 Behavioral Risk Factor Surveillance System (BRFSS).

Note: All point estimates are among non-elderly adults aged 19-64. All estimates presented in this table are survey weighted to reflect the complex sampling strategies of the CPS-ASEC and the BRFSS.

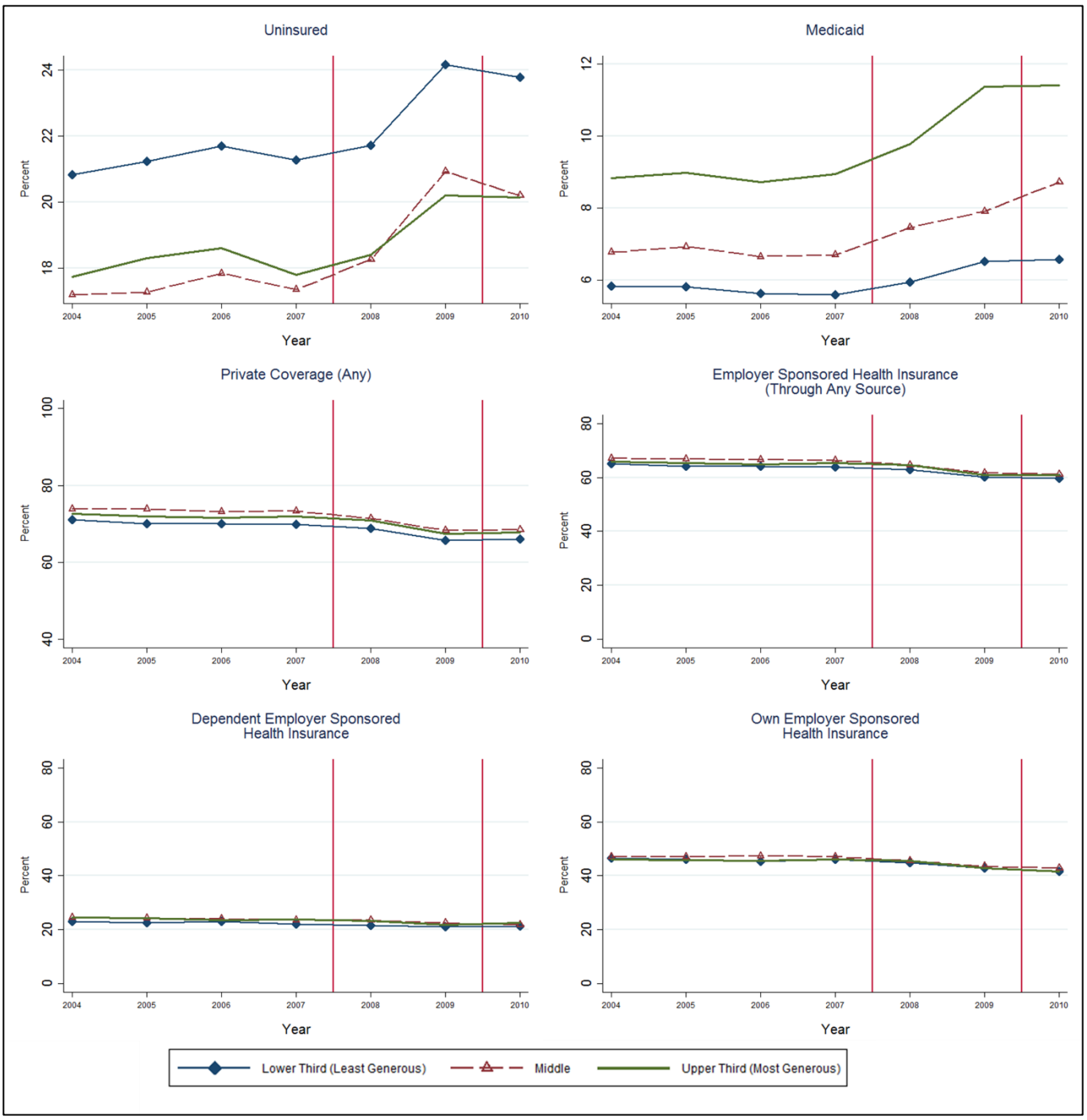



**Figure 2. Trends in Source of Health Insurance Coverage by State's Relative Level of Medicaid Generosity, 2004-2010.**

Source: Authors' own analysis of the IPUMS version of Annual Social & Economic Supplement of Current Population Survey, 2005-2011.

Note: All graphics represent unadjusted trends among non-elderly adults aged 19-64. Median percent eligible for Medicaid across the three groups is as follows: 1) Lower third [4.0%], 2) Middle third [6.6%], and 3) Upper third [16.4%]. The recession years are 2008-2009, and 2010 indicates the post-recession year. Compared to other surveys whose data are interpretable as "point-in-time (i.e. at the time of the interview)" estimates (e.g. BRFSS, ACS), the CPS-ASEC coverage estimates are regarding "any point" in the past year—thereby forcing survey participants to recall events such as their health coverage status over the past year.

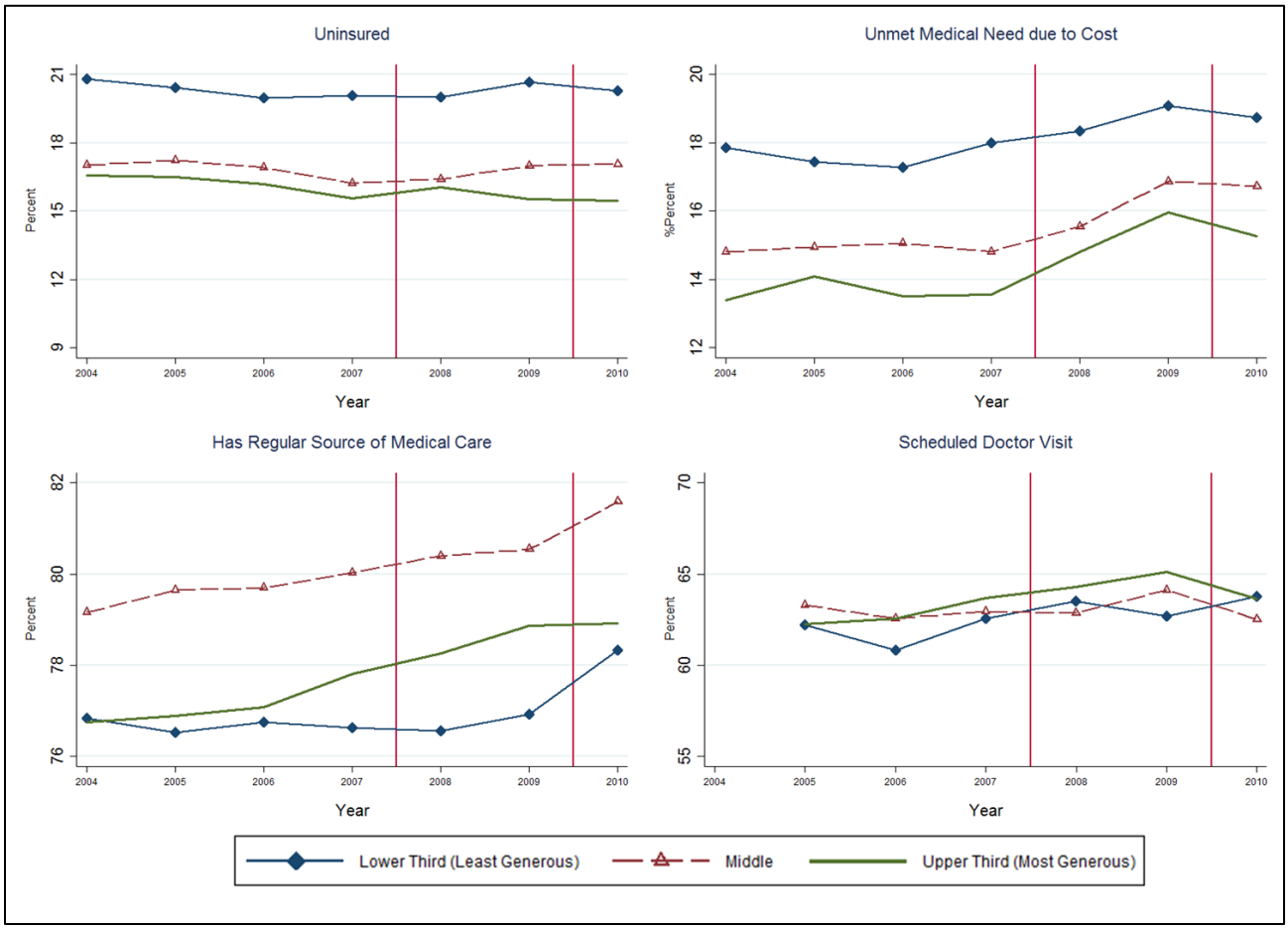



**Figure 3. Trends in Health Insurance Coverage and Access to Care by State's Relative Level of Medicaid Generosity, 2004-2010.**

Source: Authors' own analysis of CDC's Behavioral Risk Factor Surveillance System, 2003-2010.

Note: All graphics represent unadjusted trends among non-elderly adults aged 19-64. Median percent eligible for Medicaid across the three groups is as follows: 1) Lower third [4.0%], 2) Middle third [6.6%], and 3) Upper third [16.4%]. The recession years are 2008-2009, and 2010 indicates the post-recession year.

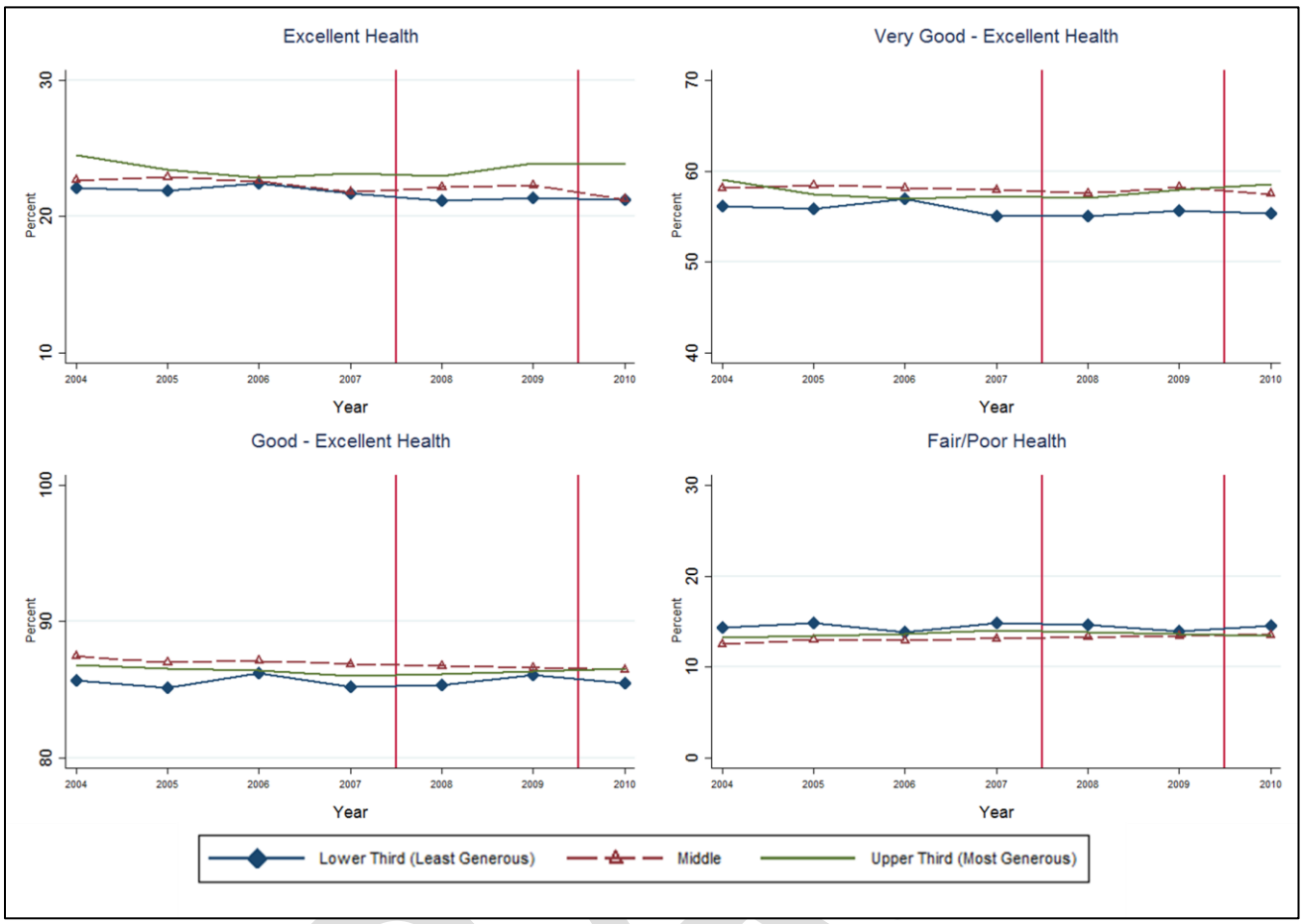



**Figure 4. Trends in Self-Reported Health Status by State's Relative Level of Medicaid Generosity, 2004-2010.**

Source: Authors' own analysis of CDC's Behavioral Risk Factor Surveillance System, 2003-2010.

Note: All graphics represent unadjusted trends among non-elderly adults aged 19-64. Median percent eligible for Medicaid across the three groups is as follows: 1) Lower third [4.0%], 2) Middle third [6.6%], and 3) Upper third [16.4%]. The recession years are 2008-2009, and 2010 indicates the post-recession year.

**Table 3. Changes in Levels of Source of Health Insurance Coverage during and After the 2008-2009 Recession.**

| | (1) Uninsured | (2) Medicaid | (3) Private Coverage | (4) Employer Sponsored Health Insurance (ESHI) | (5) ESHI-Through Own Employment | (6) ESHI-Through Dependency Status |
|---|---|---|---|---|---|---|
| 2007 Mean of Outcome | 18.8% | 7.2% | 71.7% | 65.2% | 46.4% | 23.1% |
| Interim Recession (2008-2009) | 1.28* | 1.30** | -2.73*** | -2.38*** | -1.92*** | -0.92* |
| | (0.75) | (0.53) | (0.75) | (0.71) | (0.57) | (0.48) |
| Post-Recession (2010) | 1.32** | 1.23** | -2.83*** | -2.94*** | -3.50*** | -0.40 |
| | (0.63) | (0.51) | (0.73) | (0.81) | (0.65) | (0.47) |
| Middle Third × Interim Recession | 0.56 | 0.68** | -0.84* | -0.87* | -0.34 | -0.22 |
| | (0.41) | (0.26) | (0.44) | (0.44) | (0.44) | (0.31) |
| Middle Third × Post-Recession | -0.11 | 1.10** | -0.22 | -0.21 | 0.67 | -0.87* |
| | (0.57) | (0.49) | (0.71) | (0.81) | (0.69) | (0.44) |
| Upper Third × Interim Recession | -0.46 | 1.53*** | -0.12 | -0.20 | 0.34 | -0.58* |
| | (0.59) | (0.37) | (0.58) | (0.58) | (0.48) | (0.33) |
| Upper Third × Post-Recession | -0.97 | 1.82*** | 0.58 | 0.73 | 0.79 | -0.27 |
| | (0.71) | (0.48) | (0.84) | (0.91) | (0.72) | (0.47) |
| Observations | 854,077 | 854,077 | 854,077 | 854,077 | 854,077 | 854,077 |
| Demographic Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| State Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| State-level Clustered Std. Errors | Yes | Yes | Yes | Yes | Yes | Yes |

Source: Authors' own analysis of the IPUMS version of the 2005-2011 Current Population Survey's Annual Social and Economic (CPS-ASEC) Supplement.
Note: * p<0.1, ** p<0.05, *** p<0.01. Standard errors are clustered at the state level. Coefficients are scaled by 100 for presentation. Linear regression models are presented in the table to allow for direct interpretation of the coefficients as policy effects. Demographic controls include: age, gender, marital status, number of own children in household, racial/ethnic group, educational attainment, state-level fixed effects, year-fixed effects, the state's seasonally adjusted unemployment rate, and the share of the state's labor force with union membership. All regressions are survey-weighted to account for the complex sampling strategy of the survey.

**Table 4. Changes in Levels of Coverage, Access to Care, and Self-Reported Health Status during and after the 2008-2009 Recession.**

| | (1) Uninsured | (2) Unmet Medical Need due to Cost | (3) Has a Regular Source of Medical Care | (4) Scheduled Visit to Doctor for Check-Up | (5) Excellent Health | (6) Very Good/Excellent Health | (7) Good/Very Good/Excellent Health | (8) Fair/Poor Health |
|---|---|---|---|---|---|---|---|---|
| 2007 Mean of Outcome | 17.2% | 15.3% | 78.1% | 63.1% | 22.3% | 56.7% | 86.0% | 14.0% |
| Interim Recession (2008-2009) | 0.26 | 2.73** | -0.72 | 2.07 | -0.038 | -0.82 | 0.36 | -0.36 |
| | (0.81) | (1.14) | (0.91) | (2.24) | (1.04) | (0.91) | (1.12) | (1.12) |
| Post-Recession (2010) | 0.87 | 2.17* | -0.86 | 1.69 | -0.57 | -2.90** | 0.058 | -0.058 |
| | (0.82) | (1.27) | (1.31) | (1.98) | (1.08) | (1.33) | (1.13) | (1.13) |
| Middle Third × Interim Recession | -0.11 | -0.19 | 0.86* | -0.37 | 0.62 | 0.25 | -0.17 | 0.17 |
| | (0.56) | (0.38) | (0.48) | (0.70) | (0.75) | (0.50) | (0.30) | (0.30) |
| Middle Third × Post-Recession | -0.18 | 0.17 | 0.030 | -1.19 | 0.20 | 0.30 | -0.52 | 0.52 |
| | (0.59) | (0.29) | (0.92) | (1.88) | (0.38) | (0.52) | (0.45) | (0.45) |
| Upper Third × Interim Recession | 0.15 | 0.21 | 1.47*** | 0.93 | 0.76 | 0.31 | -0.029 | 0.029 |
| | (0.48) | (0.51) | (0.39) | (0.76) | (0.47) | (0.61) | (0.40) | (0.40) |
| Upper Third × Post-Recession | -1.34** | 0.031 | 0.67 | -0.20 | 1.45*** | 1.41*** | -0.050 | 0.050 |
| | (0.51) | (0.43) | (0.85) | (1.43) | (0.38) | (0.51) | (0.48) | (0.48) |
| Observations | 1,693,056 | 1,693,056 | 1,690,118 | 1,024,005 | 1,693,056 | 1,693,056 | 1,693,056 | 1,693,056 |
| Demographic Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| State Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Month Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| State-level Clustered Std. Errors | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Source: Authors' own analysis of the 2004-2010 Behavioral Risk Factor Surveillance System (BRFSS).

Note: * p<0.1, ** p<0.05, *** p<0.01. Standard errors are clustered at the state level. Coefficients are scaled by 100 for presentation. Linear regression models are presented in the table to allow for direct interpretation of the coefficients as policy effects. Demographic controls include: age, gender, marital status, number of own children in household, racial/ethnic group, and educational attainment. Also included are state-level fixed effects and month time dummies to account for differences in the outcome due to the timing of the survey. We also include the state-month specific unemployment rates to control for changes in the macroeconomic conditions within each state across time. All regressions are survey-weighted to account for the complex sampling strategy of the survey.

**Table 5. Changes in Source of Health Insurance Coverage in response to Changes in State Unemployment Rate.**

| | (1) Uninsured | (2) Medicaid | (3) Private Coverage | (4) Employer Sponsored Health Insurance (ESHI) | (5) ESHI-Through Own Employment | (6) ESHI-Through Dependency Status |
|---|---|---|---|---|---|---|
| State Unemployment Rate | 0.45*** | -0.27* | -0.48*** | -0.41** | -0.49** | 0.061 |
| | (0.17) | (0.14) | (0.16) | (0.19) | (0.21) | (0.10) |
| Middle Third × State Unemployment Rate | -0.0065 | 0.16** | -0.029 | -0.060 | 0.079 | -0.11* |
| | (0.093) | (0.073) | (0.10) | (0.13) | (0.14) | (0.065) |
| Upper Third × State Unemployment Rate | -0.21** | 0.31*** | 0.098 | 0.082 | 0.14 | -0.074 |
| | (0.095) | (0.083) | (0.11) | (0.15) | (0.14) | (0.066) |
| Observations | 854,077 | 854,077 | 854,077 | 854,077 | 854,077 | 854,077 |
| Demographic Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| State Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| State-level Clustered Std. Errors | Yes | Yes | Yes | Yes | Yes | Yes |

Source: Authors' own analysis of the IPUMS version of the 2005-2011 Current Population Survey's Annual Social and Economic (CPS-ASEC) Supplement.
Note: * p<0.1, ** p<0.05, *** p<0.01. Standard errors are clustered at the state level. Coefficients are scaled by 100 for presentation. Linear regression models are presented in the table to allow for direct interpretation of the coefficients as policy effects. Demographic controls include: age, gender, marital status, number of own children in household, racial/ethnic group, and educational attainment. All regressions are survey-weighted to account for the complex sampling strategy of the survey.

**Table 6. Changes in Coverage, Access to Care, and Self-Reported Health Statues in response to Changes in State Unemployment Rate.**

| | (1) Uninsured | (2) Unmet Medical Need due to Cost | (3) Has a Regular Source of Medical Care | (4) Scheduled Visit to Doctor for Check-Up | (5) Excellent Health | (6) Very Good/Excellent Health | (7) Good/Very Good/Excellent Health | (8) Fair/Poor Health |
|---|---|---|---|---|---|---|---|---|
| State Unemployment Rate | 0.33** | 0.46*** | -0.057 | 0.055 | -0.26* | -0.20 | -0.22** | 0.22** |
| | (0.16) | (0.12) | (0.12) | (0.30) | (0.13) | (0.14) | (0.10) | (0.10) |
| Middle Third × State Unemployment Rate | -0.12 | 0.048 | 0.095 | -0.21 | 0.070 | 0.10 | -0.032 | 0.032 |
| | (0.11) | (0.074) | (0.15) | (0.33) | (0.083) | (0.090) | (0.065) | (0.065) |
| Upper Third × State Unemployment Rate | -0.26*** | 0.076 | 0.18 | -0.073 | 0.24** | 0.23*** | -0.00072 | 0.00072 |
| | (0.084) | (0.10) | (0.15) | (0.29) | (0.093) | (0.076) | (0.075) | (0.075) |
| Observations | 1,693,056 | 1,693,056 | 1,690,118 | 1,024,005 | 1,693,056 | 1,693,056 | 1,693,056 | 1,693,056 |
| Demographic Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| State Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Month Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| State-level Clustered Std. Errors | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Source: Authors' own analysis of the 2004-2010 Behavioral Risk Factor Surveillance System (BRFSS).

Note: * p<0.1, ** p<0.05, *** p<0.01. Standard errors are clustered at the state level. Coefficients are scaled by 100 for presentation. Linear regression models are presented in the table to allow for direct interpretation of the coefficients as policy effects. Demographic controls include: age, gender, marital status, number of own children in household, racial/ethnic group, and educational attainment. Also included are state-level fixed effects and month time dummies to account for differences in the outcome due to the timing of the survey. All regressions are survey-weighted to account for the complex sampling strategy of the survey.

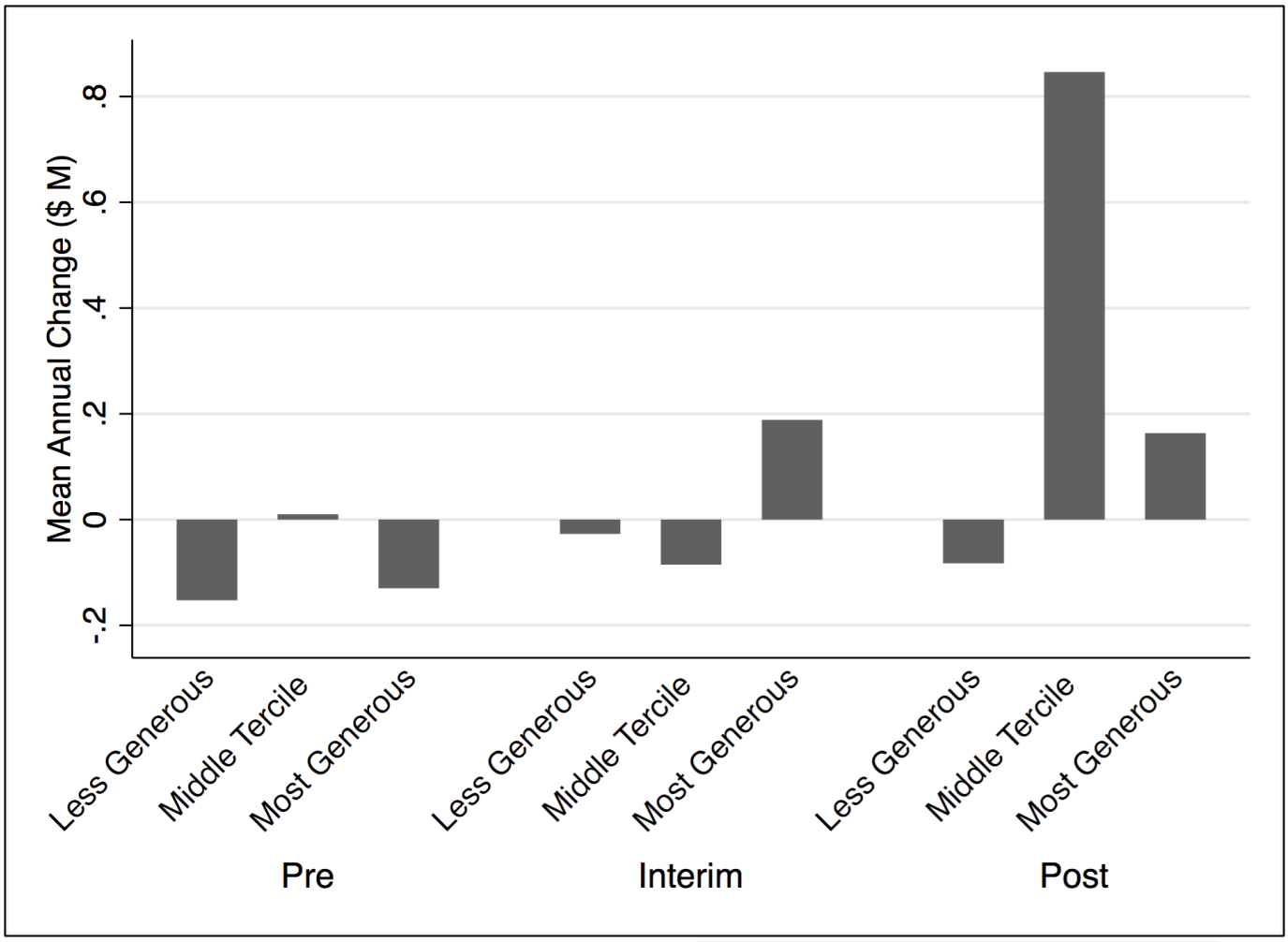
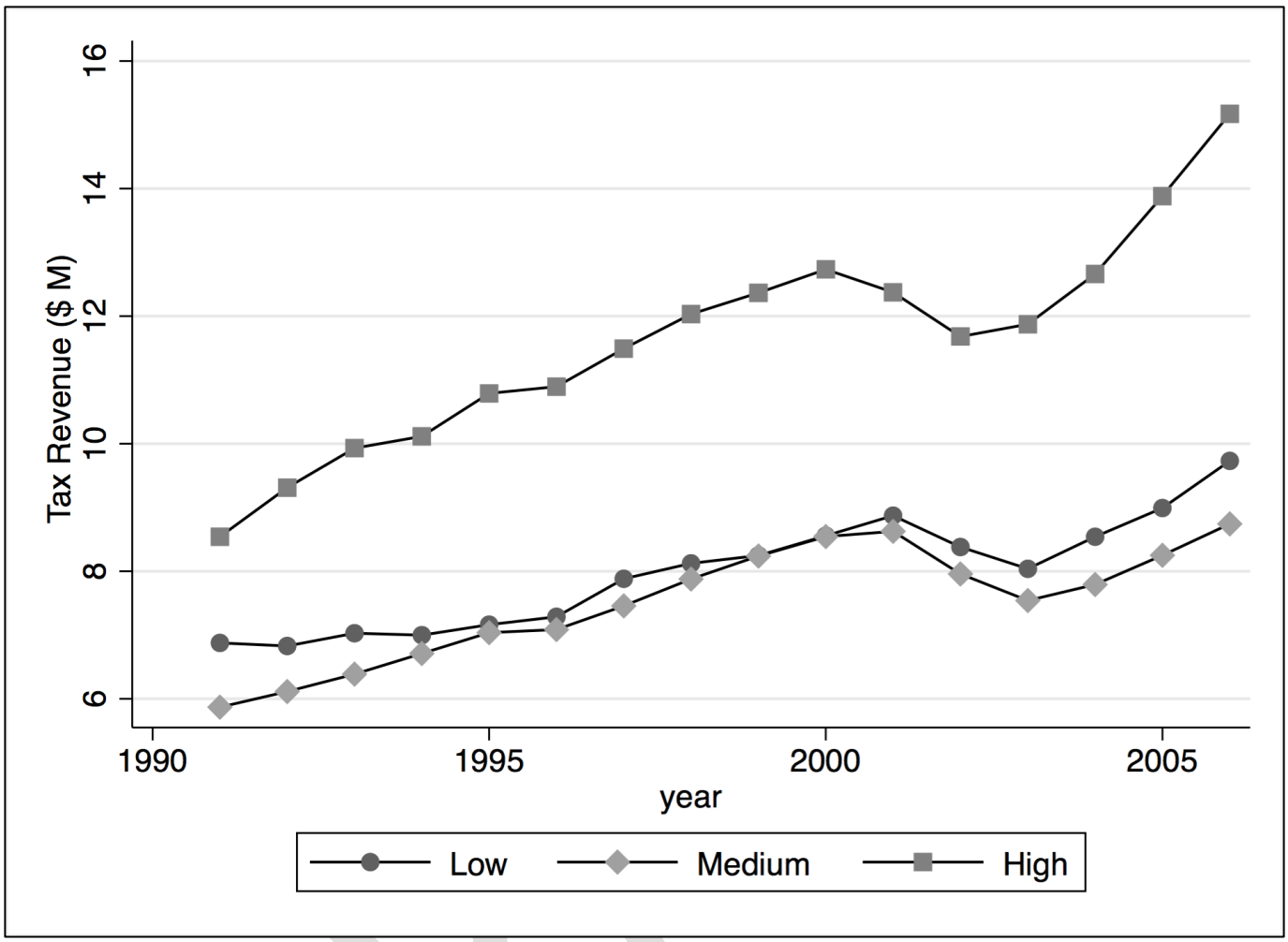



**Figure A1. Average Change in Trends in Spending on Medicaid Enrollment Brokers, Outreach Efforts, and Eligibility Outstations**

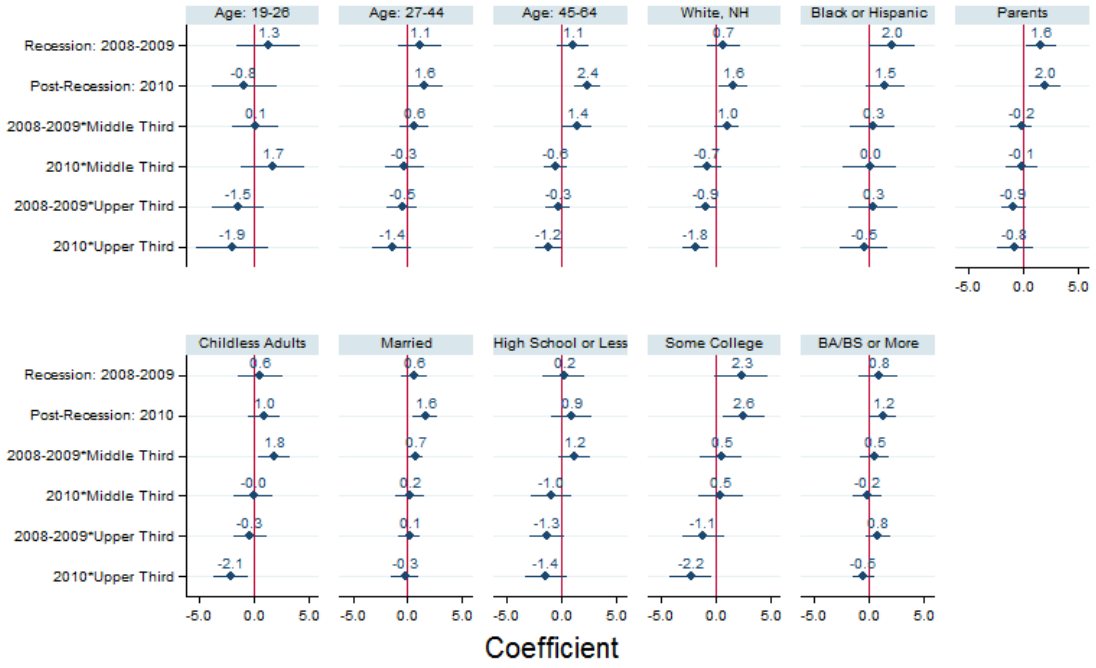
Source: Authors' own analysis of CMS-64 Expenditure Reports, 2001-2010.

Note: All graphics represent unadjusted average annual change in spending by level of extensive margin generosity and period. Changes are measured in millions of 2016 dollars. State generosity is measured by eligibility rules applied to non-elderly adults aged 19-64. Median percent eligible for Medicaid across the three groups is as follows: 1) Lower third [4.0%], 2) Middle third [6.6%], and 3) Upper third [16.4%]. The recession years are 2008-2009, and 2010 indicates the post-recession year.

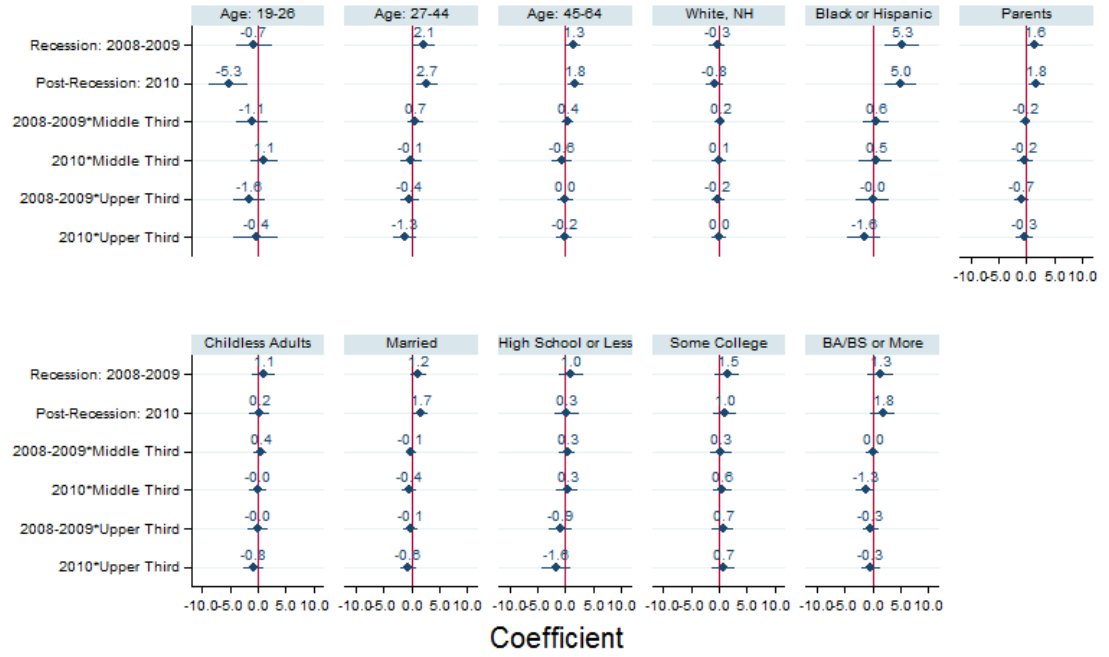



**Appendix Figure A2. Average Change in Total Tax Revenue by Medicaid Generosity, 1990 to 2007**
Source: Authors' own analysis of Census State Government Tax Collections, 1990 to 2007.
Note: All graphics represent average tax revenue collected by states, measured in millions of 2016 dollars. State generosity is measured by eligibility rules applied to non-elderly adults aged 19-64. Median percent eligible for Medicaid across the three groups is as follows: 1) Lower third [4.0%], 2) Middle third [6.6%], and 3) Upper third [16.4%].

Panel A. Uninsured, Women only.

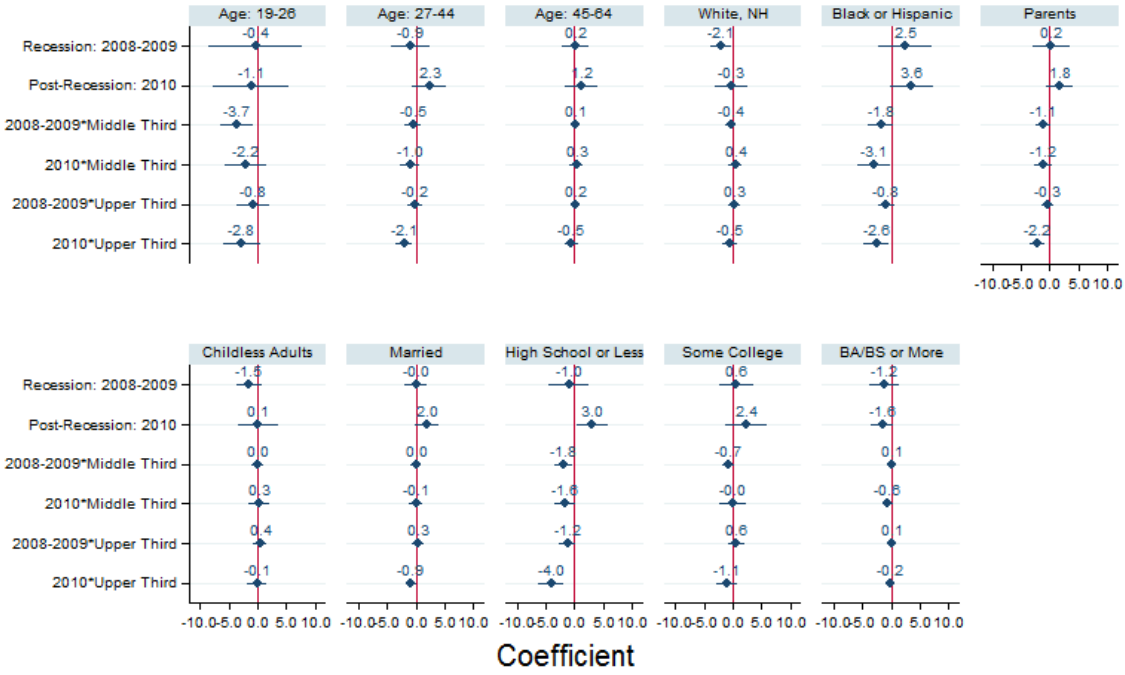



Panel B. Uninsured, Men only.

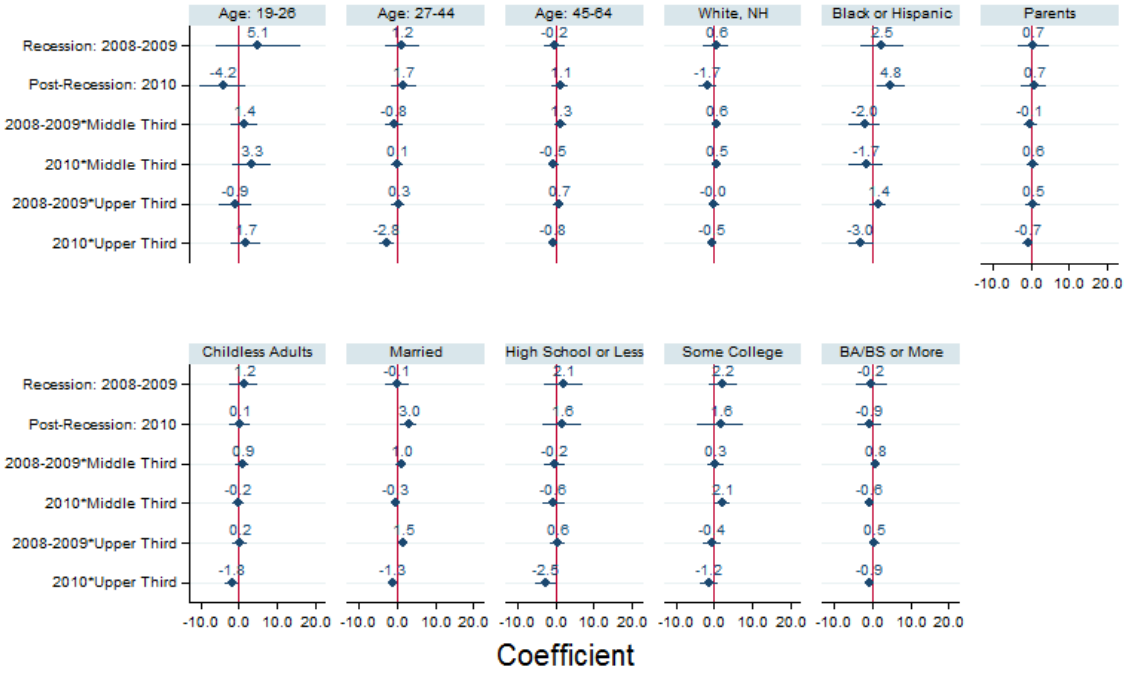



**Appendix Figure A3. Sub-group Analyses of Effect of Recession's Timing on Health Insurance Coverage Status using the 2005-2011 CPS-ASEC.**

Panel A. Uninsured, Women only.

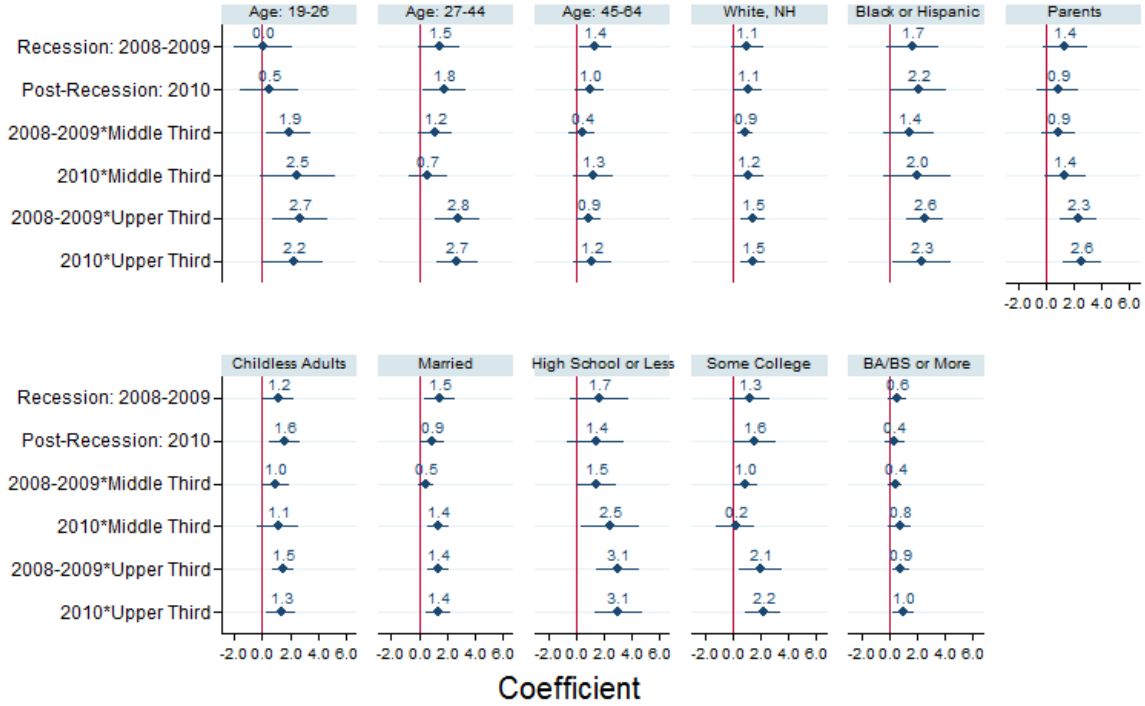



Panel B. Uninsured, Men only.

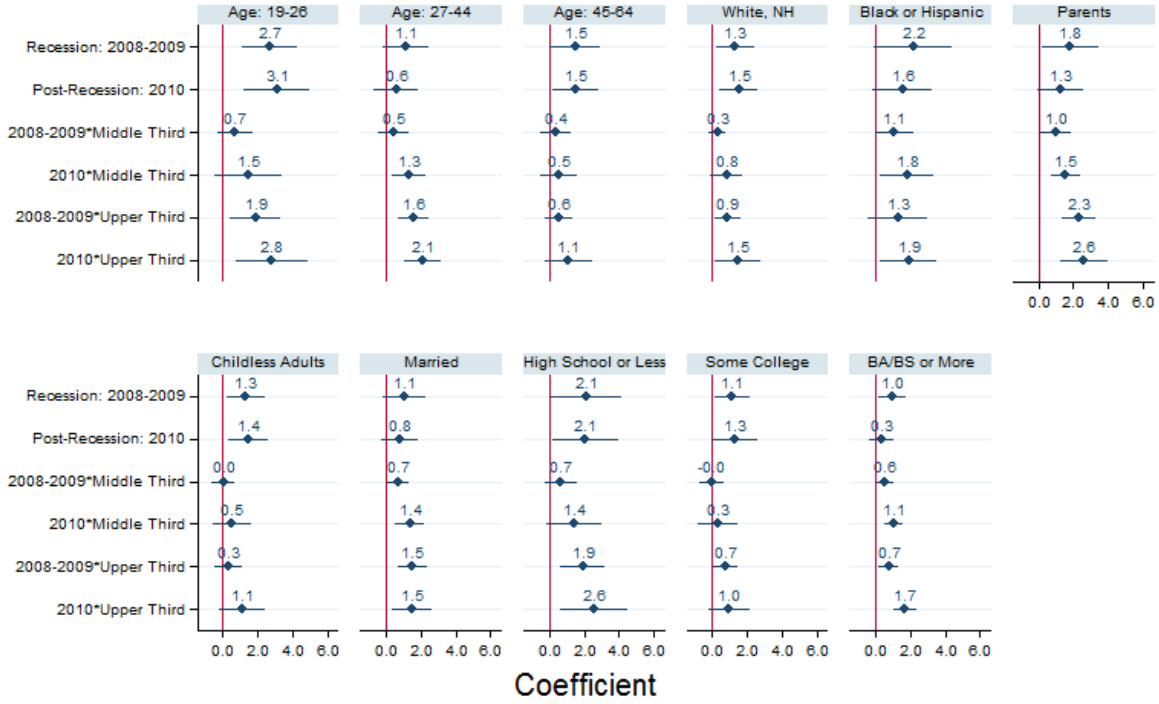



**Appendix Figure A4. Sub-group Analyses of Effect of Recession's Timing on Health Insurance Coverage Status using the 2004-2011 BRFSS.**

Panel A. Medicaid Participation, Women only.

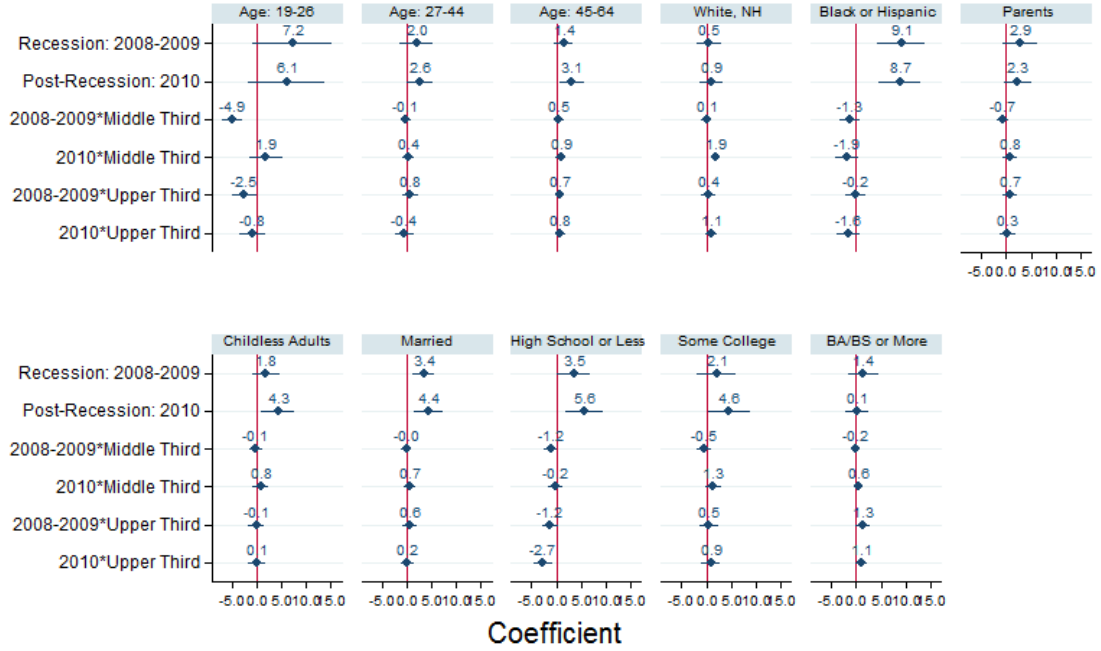



Panel B. Medicaid Participation, Men only.

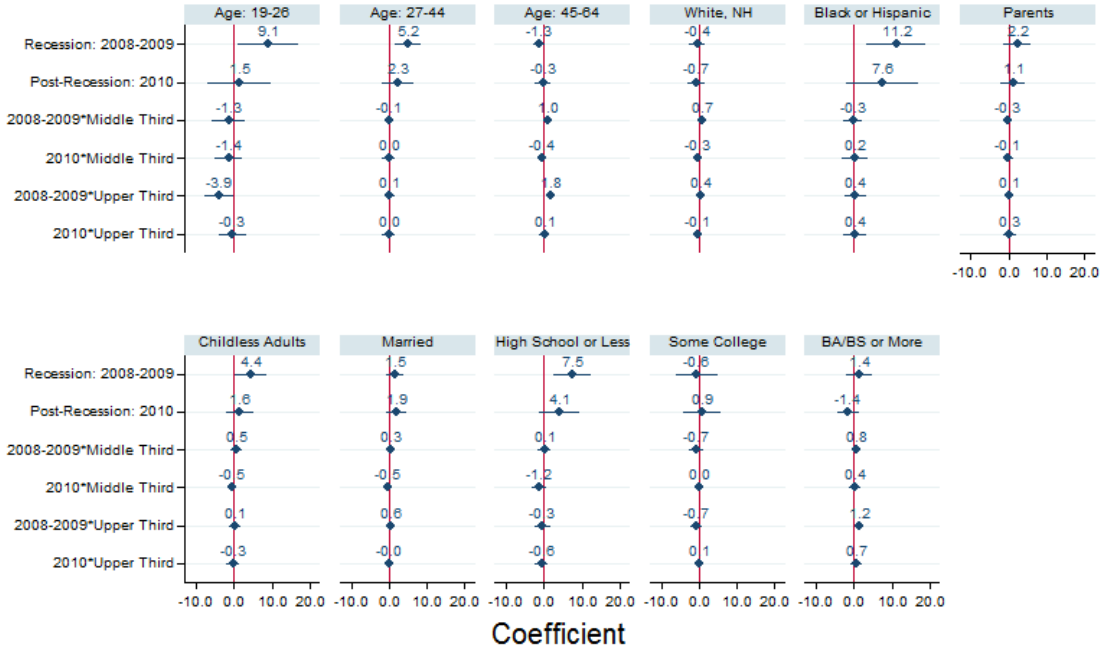



**Appendix Figure A5. Sub-group Analyses of Effect of Recession's Timing on Medicaid participation using the 2005-2011 CPS-ASEC.**

Panel A. Unmet Medical Need due to Cost, Women only.




Panel B. Unmet Medical Need due to Cost, Men only.




**Appendix Figure A6. Sub-group Analyses of Effect of Recession's Timing on Unmet Medical Needs due to Cost using the 2004-2011 BRFSS.**

**Table A1. Sensitivity Analysis of Heterogeneous Effects of the Recession on Health Insurance Coverage Status.**

| | (1) Uninsured | (2) Uninsured | (3) Uninsured | (4) Uninsured | (5) Medicaid | (6) Medicaid | (7) ESHI | (8) ESHI |
|---|---|---|---|---|---|---|---|---|
| Interim Recession | 1.60** | 1.41* | 0.31 | 0.66 | 0.85 | 1.06** | -2.54*** | -2.41*** |
| | (0.70) | (0.76) | (0.73) | (0.85) | (0.57) | (0.49) | (0.72) | (0.77) |
| Post-Recession | 1.37** | 1.27** | 1.14 | 0.98 | 0.93 | 0.90* | -2.89*** | -2.61*** |
| | (0.57) | (0.56) | (0.86) | (0.80) | (0.59) | (0.50) | (0.82) | (0.83) |
| 2007 %Simulated Medicaid Eligibility × Interim Recession | -0.027 | | 0.015 | | 0.078*** | | -0.017 | |
| | (0.020) | | (0.024) | | (0.016) | | (0.027) | |
| 2007 %Simulated Medicaid Eligibility × Post-Recession | -0.035 | | -0.064** | | 0.086*** | | 0.0065 | |
| | (0.027) | | (0.031) | | (0.023) | | (0.036) | |
| 25th-75th Percentile of 2007 %Simulated Medicaid Eligibility × Interim Recession | | 0.47 | | 0.40 | | 0.28 | | -0.43 |
| | | (0.49) | | (0.49) | | (0.29) | | (0.51) |
| 25th-75th Percentile of 2007 %Simulated Medicaid Eligibility × Post-Recession | | 0.026 | | 0.27 | | 0.85* | | -0.16 |
| | | (0.57) | | (0.43) | | (0.48) | | (0.92) |
| >75th Percentile of 2007 %Simulated Medicaid Eligibility × Interim Recession | | -0.69 | | -0.32 | | 1.89*** | | -0.44 |
| | | (0.79) | | (0.60) | | (0.37) | | (0.79) |
| >75th Percentile of %Simulated Medicaid Eligibility × Post-Recession | | -0.86 | | -1.61*** | | 2.27*** | | -0.058 |
| | | (0.87) | | (0.55) | | (0.63) | | (0.89) |
| Observations | 854,812 | 854,812 | 1,693,056 | 1,693,056 | 854,812 | 854,812 | 854,812 | 854,812 |
| Demographic Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| State Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | No | No | Yes | Yes | Yes | Yes |
| Month Fixed Effects | --- | --- | Yes | Yes | --- | --- | --- | --- |
| State-level Clustered Std. Errors | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Data Source | CPS-ASEC | CPS-ASEC | BRFSS | BRFSS | CPS-ASEC | CPS-ASEC | CPS-ASEC | CPS-ASEC |

Source: Authors' own analysis of the 2004-2010 Behavioral Risk Factor Surveillance System (BRFSS).

Note: * p<0.1, ** p<0.05, *** p<0.01. Standard errors are clustered at the state level. Coefficients are scaled by 100 for presentation. Linear regression models are presented in the table to allow for direct interpretation of the coefficients as policy effects. Demographic controls include: age, gender, marital status, number of own children in household, racial/ethnic group, and educational attainment. Also included are state-level fixed effects and time dummies (i.e. fixed effects) to account for differences in the outcome due to the timing of the survey. We also include the state-month specific unemployment rates to control for changes in the macroeconomic conditions within each state across time. All regressions are survey-weighted to account for the complex sampling strategy of the survey. Under the alternative generosity classification (columns 2, 4, 6, and 8), states in the least generous category regarding Medicaid eligibility are those whose simulated eligibility ranked below the 25th-percentile, those states include: AL, AR, ID, IN, KS, LA, MD, MS, MO, TX, UT, VA, and WV. States in the middle category of Medicaid generosity simulated eligibility were between the 25th and 75th percentiles: AK, CA, CO, DE, FL, GA, HI, IA, KY, MI, MT, NE, NV, NH, NM, NC, ND, OH, OK, OR, PA, SC, SD, TN, WA, and WY. States whose simulated eligibility measures were in the upper quartile (i.e. above the 75th percentile) were classified as the more generous states: AZ, CT, DC, IL, ME, MA, MN, NJ, NY, RI, VT, and WI.