Closing the Gap: The Impact of the Medicaid Primary Care Rate Increase on Access and Health*

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Abstract

The difficulties that Medicaid beneficiaries face accessing medical care are often attributed to the program's low reimbursement rates relative to other payers. There is little evidence, however, as to the actual effects of Medicaid payment rates for providers on access and health outcomes for beneficiaries. In this paper, we exploit time-series variation in Medicaid reimbursement rates primarily driven by the Medicaid fee bump—a provision of the Affordable Care Act mandating that states raise Medicaid payments to match Medicare rates for primary care visits for 2013 and 2014—to quantify the impact of physician payment on access to treatment. We find that increasing Medicaid payments to primary care doctors is associated with improvements in access, better self-reported health, and fewer school days missed among beneficiaries.

JEL: I18, H51, H75, I11
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1 Introduction

Despite being covered by the nation's largest insurer, Medicaid beneficiaries often have a hard time finding available health care providers. Many doctors either do not accept Medicaid or are not currently accepting new Medicaid patients: in 2009, office-based physicians were 35% less likely to accept new patients covered by Medicaid than by private insurance (Medicaid and CHIP Payment and Access Commission, 2011). Whether this preference for the privately insured is driven by differences in reimbursement generosity—rather than Medicaid payment delays, complex program requirements, and concerns about managing the care of difficult patients—remains an open question (Long, 2013; Rosenbaum, 2014). Will increasing Medicaid payments to primary care physicians improve access and health among beneficiaries?

In this paper, we exploit exogenous variation in the generosity of Medicaid reimbursement rates for primary care providers to estimate the effect of physician reimbursement on access and health outcomes. Most of the variation in physician payments comes from a federal mandate that states increase Medicaid payments for primary care services to Medicare levels in 2013 and 2014.[1] As Medicaid is administered at the state level, physician payments varied geographically by large margins before the mandate went into effect. A few states already had very generous Medicaid payments relative to Medicare, and thus were unaffected. In other states, however, the payments to doctors for primary care services more than doubled. Before the primary care rate increase, Medicaid programs paid doctors just 66 percent of Medicare payments for the same services on average across states (Zuckerman and Goin, 2012). The rate increase was designated in Section 1202 of the Affordable Care Act (ACA), was federally funded, and was intended to ease the absorption of new Medicaid enrollees entering through the ACA's Medicaid expansion by encouraging primary care physicians to participate in Medicaid (Blumenthal and Collins, 2014).

We find that increased physician reimbursement for new Medicaid patients is associated with statistically and economically significant improvements in access to primary care, using a new

[1] The primary care services covered by the fee boost include evaluation and management services and vaccine administration provided by physicians in family medicine, general internal medicine, and pediatric medicine.

database of state-level Medicaid reimbursement rates for primary care services from 2009 to 2015, combined with access measures from the National Health Interview Survey (NHIS). A $10 increase in Medicaid payments to primary care doctors is associated with a 26 percent decrease in parents reporting having trouble finding a doctor for their Medicaid-covered children, and decreases in reports of doctors telling adult Medicaid beneficiaries that they are not accepting new patients or their insurance of 14 and 11 percent, respectively. Having an easier time finding a doctor also translates into seeing doctors more often; a $10 increase in Medicaid payments is associated with an 1.5 percent increase in the probability that Medicaid beneficiaries visited a doctor in the past two weeks.

Increased physician reimbursement under Medicaid is further associated with improvements in self-reported health and school attendance among the program's beneficiaries. We find modest improvements in self-reported health across all Medicaid beneficiaries, as well as dramatic improvements in school attendance among children, which come primarily from the far right tail of the absence distribution. Using a combination of self-reported data from the NHIS and educational attainment data from the National Assessment of Educational Progress (NAEP), we find that a $10 increase in Medicaid payments is associated with a decrease in chronic absenteeism of 2 to 8 percent, where the larger estimates are for measures of absences due to illness and injury. Finally, there is no evidence that the benefits of increasing Medicaid payment rates are offset by negative spillovers for the privately insured.

Of course, the changes in Medicaid payments stemming from the primary care fee boost did not occur in isolation. The US health care system in general, and Medicaid in particular, experienced many changes between 2009 and 2015. Following the 2012 decision by the Supreme Court, in 2014, 27 states and the District of Columbia expanded their Medicaid programs to include coverage for low-income adults without children. While the timing is similar, we do not believe that our results are confounded by the 2014 Medicaid expansion for three reasons. First, we find the strongest effects of the primary care rate increase on access and health among children, whose eligibility was essentially unaffected by the Medicaid expansions. Second, we find similar effects in states that did and did not expand their Medicaid programs under the ACA. Finally, we find a similar relationship between payments and access using variation in Medicaid payments from before the 2014 Medicaid expansion.

While there is a large empirical literature studying the effect of Medicaid coverage itself on the use of medical services and health outcomes (Alexander and Currie, 2017; Baicker et al., 2013; Buchmueller et al., 2014; Currie et al., 1995; Currie and Gruber, 1996a,b; Finkelstein et al., 2012), there is less work examining how Medicaid program generosity affects access to treatment. Recent work studying the impact of reimbursement levels on physician participation in Medicaid has been hampered by two important data limitations (Atherly and Mortensen, 2014; Callison and Nguyen, 2017; Chen, 2014; Shen and Zuckerman, 2005).[2] First, most states have not made large changes to their Medicaid reimbursement rates for primary care in the last decade. Without significant and plausibly exogenous variation in payment rates within a state over time, researchers must rely on cross-sectional evidence that is likely to suffer from omitted variable bias, or small changes in just a few states. Second, the rise of Medicaid Managed Care that began in the early 1990s has made it difficult to know how much doctors are actually reimbursed through Medicaid.

Despite the fact that 60 percent of Medicaid beneficiaries were enrolled in comprehensive risk-based managed care plans in 2014, states have little knowledge about how or how much MCOs pay their doctors. Under fee-for-service, state Medicaid programs pay doctors a fixed amount for each service provided to beneficiaries. Although time consuming, these reimbursement rates are theoretically available by contacting each state (though prior work almost exclusively uses infrequently published secondary sources, such as the Urban Institute's Medicaid to Medicare fee index or the American Academy of Pediatrics Medicaid Reimbursement Reports). Conversely, under managed care states typically pay managed care organizations (MCOs) a fixed amount per

[2] Using a cross-sectional Medicaid payment variation from 1975, Long et al. (1986) find that low physician reimbursement levels do not impede access to ambulatory care. Using a similar strategy for 1987, Cohen and Cunningham (1995) demonstrate that higher Medicaid fees are associated with both primary care doctors accepting more Medicaid patients and a greater likelihood of children having a doctor's office as a usual source of care. Baker and Royalty (2000) look at changes in Medicaid-to-private fee ratios between 1986 and 1990, and find that increases in this ratio are associated with increases in the percent poor of patients seen by office based physicians and decreases in the percent poor of patients seen by public physicians. As there have been important structural changes to both Medicaid and the US healthcare system over the past two decades, these findings from the 1970s and 1980s may no longer hold.

beneficiary to provide all covered services, and the MCO pays providers for the services. [3]

We address both of these problems simultaneously by exploiting a federally mandated change to both Medicaid fee-for-service and managed care reimbursement rates for primary care doctors. As Medicaid generosity varies considerably across states, increasing payments to Medicare levels had large and heterogeneous impacts across states. Furthermore, since state Medicaid payments were required to achieve parity with Medicare for both their fee-for-service and managed care programs, we know exactly how much doctors were reimbursed under Medicaid in 2013 and 2014. To estimate payments in the pre-period, we combine quarterly state-level fee-for-service rates collected directly from each state's Medicaid office with state-level Medicaid managed care to fee-for-service reimbursement ratios for primary care services and data on the fraction enrolled in each system in each state. We are thus able to examine the effects of changing physician payments on the entire Medicaid system, rather than just the rapidly shrinking fee-for-service portion.

To our knowledge, we are the first comprehensive study of the effects of the Medicaid primary care rate increase on access and health outcomes. Early work on the program has been hampered by lags in data availability. The only study of the fee boost of which we are aware is an early audit study, which finds that the payment increase was associated with large increases in appointment availability for Medicaid patients (Polsky et al., 2015). The research team behind Polsky et al. (2015) called doctors' offices in ten states over two time periods—11/2012-3/2013 and 5/2014-7/2014—and measured changes in appointment availability between the two periods. [4] In contrast, we use a large dataset that covers every state from 2009 to 2015, continuous variation in the magnitude of the fee boost across states (incorporating both fee-for-service and managed care payment rates), and look at both access and health outcomes measures.

The rest of the paper proceeds as follows. We provide an overview of our data in Section 2. In Section 3, we introduce our empirical strategy. Results are presented in Section 4. Section 5 provides a variety of robustness checks. Section 6 provides a discussion and concludes.

[3]Comprehensive risk-based managed care is the dominant model in Medicaid managed care, whereby states shift the financial risk for serving their Medicaid beneficiaries to the managed care organizations (Paradise, 2014).

[4]Polsky et al. (2017) update the paper with a second follow up in 2016, though the fee boost expired in 8 out of 10 states studied in 2014.

2 Data

We use three main data sources to document how changing reimbursement rates for physicians affect access to health care services and the health of Medicaid beneficiaries. To measure physician reimbursement, we construct a new dataset containing Medicaid fees for evaluation and management services for all states from 2009 to 2015. To measure access and health outcomes, we use the National Health Interview Survey (NHIS)—a large survey conducted each year to track the illnesses and disabilities in the US. Finally, to corroborate the NHIS outcomes related to schooling, we use data on school absences and test scores from the National Center for Education Statistics. These datasets are supplemented with information from the Health Resources and Services Administration's Area Resource Files (ARF) to control for spatial differences in health care resources.

2.1 Medicaid Reimbursement Rates

Our primary explanatory variable is the amount Medicaid pays doctors for new patient evaluation and management services across states and over time. Under fee-for-service, there are five Medicaid reimbursement rates for these services, each corresponding to a specific length and complexity of the visit. We obtained historical fee-for-service payment data for these five codes by contacting the Medicaid offices of all 50 states and the District of Columbia.[5] Our main results use reimbursement rates associated with a visit of mid-level complexity and severity (CPT 99203). According to CMS Medicare utilization statistics for Part B, CPT 99203 is by far the most billed new patient evaluation and management code from 2009 to 2015; unfortunately, analogous reports are not published for Medicaid.

The amount doctors are paid under fee-for-service Medicaid does not tell the full story, however, as around half of Medicaid beneficiaries were enrolled in comprehensive risk-basked managed care over our time period. We take Medicaid managed care into account by creating an expected Medicaid payment measure that combines the state-level fee-for-service data with state-

[5] Our payment data series is complete with the exception of Tennessee and South Dakota. Refer to Appendix A.2 for details on how payment rates are imputed for these two states.

level managed care to fee-for-service payment ratios and state-level managed care enrollment. To construct our main payment measure, we first create an expected payment for Medicaid managed care that scales the fee-for-service rates by the managed care to fee-for-service payment ratio for primary care services. These payment ratios come from a Government Accountability Office (GAO) report documenting the difference between managed care and fee-for-service payments under Medicaid at the state level in 2010 (Yocom, 2014).[6] Using data from the Centers for Medicare and Medicaid Services (CMS) on the percent of Medicaid beneficiaries enrolled in managed care annually in each state (see Figure 1), we then define the overall expected payment from Medicaid as the enrollment-weighted average of the fee-for-service payment and the expected managed care payment.[7]

Both the initial geographical variation in Medicaid payment rates and the changes over our sample period are substantial. Figure 2 shows the variation in our constructed measure of Medicaid primary care fees across the US at the start of our period (2009) and in the first year of the primary care rate increase (2013). In the first quarter of 2009, the expected Medicaid payment for treating a new patient (CPT 99203) varied from \$37 to \$160. The bottom dropped out of the payment distribution when the fee boost went into effect in 2013, with the least generous state paying \$101 and the most generous state paying doctors just over \$170. In fact, after the fee boost, all states' fees were within the range of the top quintile of states in the previous quarter. While there were some changes in Medicaid payment rates prior to 2013 (see Figure 3), most of our variation comes from the primary care rate increase mandated by the ACA.

[6]The GAO data only gives a Medicaid managed care to fee-for-service ratio for 20 states (see Table A.1). We use the reported ratio for the states in the report and the median ratio (5% more for managed care) for the missing states. Our results are robust to a range of assumptions about the Medicaid managed care to fee-for-service ratios for the remaining states, such as using only the states in the GAO report, and imputing missing states using the mean.

[7]That is, letting R_{sy}^{FFS} denote the Medicaid fee-for-service reimbursement rate in state s in year y, $\left(\frac{R^{MC}}{R^{FFS}}\right)_{s,2010}$ the managed care to fee-for-service payment ratio in state s in 2010, and $\%B_{sy}^{MC}$ the fraction of Medicaid beneficiaries enrolled in a managed care plan in state s in year y, the overall expected Medicaid reimbursement for evaluation and management services in each state-year before the fee increase is approximated by

$$\tilde{R_{sy}} = (1 - \%B_{sy}^{MC}) \cdot R_{sy}^{FFS} + \%B_{sy}^{MC} \cdot R_{sy}^{FFS} \cdot \left(\frac{R^{MC}}{R^{FFS}}\right)_{s,2010} \tag{1}$$

While the federally mandated rate increase in 2013 and 2014 provides exogenous variation in reimbursement rates for the later half of our time period, we also include changes to Medicaid payments made between 2009 and 2012. These earlier changes in Medicaid reimbursement rates are driven by local legislators making state budget decisions that are unlikely to be related to specific concerns over new patient evaluation and management. In particular, the we believe the precise timing of adoption is plausibly exogenous, as it comes from the idiosyncratic nature of legislative cycles. As a practical matter, however, only a handful of states made meaningful changes to their reimbursement rates between 2009 and 2012, and these fee changes are dwarfed in both number and magnitude by those from the primary care fee boost. Across states, the average change in payments from 2009 to 2012 was $4.27, and 25 states made no changes to their primary care fee schedules. The stickiness of physician payments under Medicaid highlights the difficulty of estimating how doctors respond to changing Medicaid payments; while we did not systematically collect data on payment rates before 2009, the effective dates on the payment information supplied by some states suggest that no changes had been made to their primary care physician payments since well before our time period, and in one case since 1980.

When the primary care rate increase was initially passed, it was unclear whether the federal funding for the higher rates would extend beyond 2014. In the end, the funding for the higher rates was not extended and many states chose to return to their previous payment levels in 2015 (see Figures 3 and A.2). While this provides another large change in state-level payment rates, states may have made this decision based on their experiences during the primary care rate increase. Thus, in our main analysis we do not use the variation in payments coming from the fee boost turning off in 2015. Instead, we examine the effects of this reverse experiment on health and outcome measures separately and note the potential endogeneity concerns.

Although the federal government mandated that states increase their Medicaid payments to primary care providers starting on January 1st, 2013, many states experienced implementation delays. We do not incorporate state-level variation in the implementation of the primary care rate increase into our Medicaid payment variable; that is, we use the payment rates reported by the state as effective in each month and year. States with implementation delays were required to retroactively pay doctors the difference between the amount paid and the enhanced Medicaid rate for dates of service starting January 1, 2013 (CMS 2370-F). We therefore believe that even if a state had a delayed implementation, the behavior of physicians, who are largely not credit constrained, should respond at the start of the fee increase rather than when the higher payments were actually released.

Finally, we can only expect physician behavior to respond to increased payment rates if doctors are aware of changes in reimbursement. While we cannot formally assess how much physicians know about reimbursements under Medicaid, we note that the federally mandated primary care rate increase was covered widely by news outlets. For example, *The Washington Post* published an article on December 21, 2012—before the fee increase went into effect—titled "Obamacare is about to give Medicaid docs a 73 percent raise" (Kliff, ed, 2012). As payments more than doubled for primary care physicians in some states, we find it reasonable that physicians would take notice of the change, and thus there is scope for physician behavior to respond.

2.2 National Health Interview Survey

The National Health Interview Survey is the largest in-person household health survey in the US, and is designed to measure the amount, distribution, and effects of illness and disability in the United States, and the services rendered for or because of such conditions. Importantly, the sample size is large enough for the survey to be representative at the state level, and information on insurance coverage and type of insurer are collected.

The outcome variables we draw from the NHIS can be divided into two broad categories: (1) access to and use of health care services and (2) health outcomes. We use outcomes from three NHIS components: family, sample child, and sample adult. The family component collects demographic information and answers to basic questions (e.g., health status) for all members in the family. The sample child and sample adult components each sample one child and one adult in the family, respectively, and ask a longer list of more detailed questions (e.g., days of school or work missed in the past year). Sample sizes are thus more limited when working with questions only asked to the sample child or sample adult relative to the full family sample (see Table 1).

To measure access to health care services, we consider whether respondents had a doctors' office visit in the past two weeks, and whether respondents report difficulty with doctors either not accepting new patients or not accepting their insurance.[8] For children, we further consider indicators denoting whether parents report having difficulty finding a doctor to see their child and whether their child has a usual place of care. As seen in Table 1, Medicaid beneficiaries have a similar likelihood of visiting a doctor in the past two weeks to the privately insured. However, those covered by Medicaid are much more likely to report difficulties finding doctors.

To measure health outcomes, we focus on summary measures that are applicable to the entire health distribution. First, we consider indicators denoting whether people rate their health as excellent/very good or fair/poor. While self-reported, this measure represents a summary of a person's view of their own health status, and how it affects their day to day life. For a more objective measure, we further consider the number of school and work days respondents report having missed in the past year.

Baseline differences in health status between those covered by Medicaid and private insurers are large. Survey respondents covered by Medicaid are almost three times more likely to report being in fair or poor health than the privately insured (Table 1). Medicaid beneficiaries also report missing many more days of school and work per year than the privately insured. Assuming a 180 day school year, Table 1 suggests that children on Medicaid have an absentee rate of 6.7 percent. Privately insured children, on the other hand, report a much lower absentee rate of 4.1 percent, which is more in line with previous research on school attendance (Currie et al., 2009; Fowler et al., 1992). Given that school absences have been shown to limit human capital attainment, these differences in absenteeism may translate into meaningful differences in later life outcomes (Currie et al., 2009; Grossman and Kaestner, 1997). Furthermore, as most school absences are attributable to either respiratory infections or gastroenteritis, illnesses that are most commonly treated in a

[8]The exact survey questions used are outlined in Appendix A.1. All questions are asked over our full sample period except those asking whether children and adults had trouble finding a doctor, which started in 2011.

primary care setting, school absenteeism may be particularly responsive to increased access to primary care (Gilliland et al., 2001).

The NHIS contains many different outcome variables that represent different facets of a person's health, as well as their interactions with the health care system. First and foremost, we expect higher Medicaid payments to doctors to influence Medicaid beneficiaries' access to treatment. When considering the health effects of increases in primary care, however, selecting outcomes becomes more difficult for two reasons. First, as primary care is often preventive, health improvements which may follow an increase in access will likely be slow to appear. Second, even in a large survey, the occurrence of rare conditions and events such as the use of hospitals and emergency rooms is fairly sparse. Because of these limitations, we use summary measures which are relevant to the entire population, and could reasonably be quickly influenced by changes in the availability of primary care.

Our main sample contains the population for which changes in Medicaid payments to doctors are directly relevant: Medicaid beneficiaries. The sample size is large, with approximately 96,000 Medicaid beneficiaries in the full survey over our sample period, and between 15,000 and 17,000 Medicaid beneficiaries in the child and adult sub-samples, respectively. The sample size varies somewhat depending on the number of years a question was asked (see Table A.1 for a list of outcomes and the years they are available). We also look at the privately insured population for comparison, to examine whether the effects of changes in Medicaid reimbursement rates spill over into the care of other groups. If primary care doctors are capacity constrained and therefore unable to increase the number of patients they see, incentivizing doctors to see more Medicaid patients could lead to reductions in access for the privately insured.

To control for differences in the availability of medical resources and population demographics across states and over time, we include both individual demographic controls from the NHIS and county-level characteristics from the ARF. Table 2 reports summary statistics for included individual and county-level controls by insurer. Relative to the privately insured, Medicaid beneficiaries have lower income and education levels, live in larger families, are less likely to be married, and are more likely to be black and Hispanic. Furthermore, respondents covered by Medicaid live in poorer, more densely populated areas with fewer health care providers per capita.

While much of the NHIS data is publicly available, geographic identifiers for levels of disaggregation smaller than Census regions are restricted. In order to link our outcome measures to state-level variation in Medicaid reimbursement rates and county-level health resources, we applied for access to confidential state and county identifiers. Our analyses using the NHIS data are therefore conducted in a Census Research Data Center.

2.3 National Assessment of Educational Progress

Childhood health investments impact educational attainment, which in turn affects productivity in adulthood. Therefore, an important question is the extent to which improving access to health care is associated with better educational outcomes for low-income children. While the NHIS does consider school attendance, the question is only asked in the child subsample, which has a relatively small sample size. We therefore supplement this information with data from the National Assessment of Educational Progress (NAEP). NAEP data is provided through the National Center for Education Statistics, a federal institution that collects information on reading and mathematics assessments in grades 4 and 8 every other year in all states. While not all schools are tested in each wave, the schools and students participating in NAEP assessments are selected to be representative of all schools nationally and of public schools at the state/jurisdiction and district levels.

Importantly for our work, the NAEP reports not just test scores, but also information on fraction of children reporting different numbers of absences in the month preceding the test: 0 days, 1-2 days, 3-4 days, 5-10 days, and 11 or more. We are therefore able to consider effect of increasing physician reimbursement on the overall distribution of reported school absences, and in particular on the fraction of chronically absent children, which at the monthly level is most often defined as missing three or more days of school (Schanzenbach et al., 2016; KewalRamani et al., 2007; Ginsburg et al., 2014). We focus primarily on school absences, rather than test scores, as they are most proximate outcome to primary care. In particular, as previously discussed, school absences for younger children are often caused by primary care treatable conditions.

The NAEP data is available at the state level for grades 4 and 8 in 2009, 2011, and 2013. The information on absences is collected before both math and reading assessments. Figure 4 shows the distribution of absences reported on math and reading test scores in grades 4 and 8 over our sample period. The fraction of children in each bin is nearly identical for math and reading tests within the same grade.[9] There are large differences by grade, however, with a much larger fraction of students reporting zero absences in the past month in grade 4 than in grade 8.

As was seen in the NHIS data, there are large differences in the number of school absences by socioeconomic status.[10] While we do not observe whether children are covered by Medicaid in the NAEP data, we can isolate children that are eligible to receive free lunch and those that are not; like Medicaid, free school lunch is a means-tested program. In 4th grade, 53 percent of children ineligible for free lunch missed zero days in the past month, whereas just 44 percent of free-lunch-eligible reported missing no school. The discrepancy in school absences between free-lunch-eligible and ineligible children is similar in 8th grade, though fewer children report zero absences in both groups. The full distribution of absences broken down by free lunch eligibility are shown in Figure 5.

In all grades and subjects, average test scores are monotonically decreasing in the number of school days missed in the past month (Figure A.4). Given the negative correlation between absences and test scores, it is also conceivable that test scores could also be affected by any changes in access to primary care. Thus, we also look at the effect of primary care reimbursement to physicians on test scores, using the composite scores for the math and reading assessments.

3 Empirical Strategy

The summary statistics in Table 1 demonstrate that those covered by Medicaid tend to have worse access to health care services and worse health outcomes than the privately insured. In

[9] Discrepancies can be attributed to testing that takes place over multiple days.

[10] When comparing the absence measures between the NHIS and the NAEP, it is important to note that the NHIS asks for the number of absences over the past year, while the NAEP asks about the past month.

order to investigate the relationship between these variables and physician payment levels, we estimate the effect of changes in physician reimbursement on both health care utilization and health outcomes:

$$Outcome_{icst} = \beta_0 + \beta_1 Fee_{st} + \gamma X_i + \delta Z_{ct} + \lambda_s + \lambda_t + \epsilon_{icst} \tag{2}$$

where $Outcome_{icst}$ denotes a utilization or health outcome for individual i living in county c in state s in quarter t; Fee_{st} is the relevant Medicaid fee in state s in quarter t; X_i and Z_{ct} are vectors of individual and county characteristics, respectively (listed in Table 2); and λ_s and λ_t are state and quarter-year fixed effects, respectively. Since we include state and quarter-year fixed effects, the identification for our main coefficient of interest, β_1, comes from changes in reimbursement rates within states over time. For the outcomes covering a retrospective time period of 12 months, the fee variable used is the average of the Medicaid fees over the past four quarters. For all other NHIS outcomes, we use the average fee in the quarter of the interview. All regressions use the sampling weights provided by the NHIS, and standard errors are clustered at the state level.

When looking at the effect of Medicaid payments on the distribution of school absences or test scores, we use a similar regression specification but at the state-year level:

$$Outcome_{st} = \beta_0 + \beta_1 Fee_{st} + \lambda_s + \lambda_t + \epsilon_{st} \tag{3}$$

where $Outcome_{st}$ denotes an average schooling outcome in state s in year t; Fee_{st} is the expected Medicaid reimbursement in the first quarter of year t; and λ_s and λ_t are state and year fixed effects, respectively. As all state assessments take place from January through March, we attach average Medicaid payment rates over the first quarter to each calendar year of test scores. Standard errors are again clustered at the state level.

4 Results

Higher Medicaid payments are associated with improvements in access and health measures among Medicaid beneficiaries, but not the privately insured. Figure 6 shows strong associations in the raw data between increases in state-level Medicaid primary care rates and improvements in access and health outcomes among Medicaid beneficiaries from before the rate increase (2011-2012) to after the rate increase (2013-2014). Table 3 presents these results in regression form, where the three panels of Table 3 show the impact of a $10 increase in Medicaid reimbursement levels on the full NHIS sample, the child subsample, and the adult subsample, respectively. The first three columns of each panel show the effects of changes in Medicaid fees on survey respondents covered by Medicaid, while the last three columns show the effects of changes in Medicaid payments on respondents with private insurance.

Primary care payment increases are associated with improved access measures for both adults and children. Parents of children covered by Medicaid (Panel 2 of Table 3) report decreases in the difficulty of finding a doctor for their child and are less likely to report having no usual place of care for their child—a $10 increase is associated with a 0.55 and 0.37 percentage point decrease, respectively (reflecting a 26 and 12 percent decrease relative to the mean). Among adults on Medicaid (Panel 3 of Table 3), a $10 increase in payments is associated with both a 0.55 percentage point reduction in the probability of being turned away as a new patient and a 0.37 percentage point reduction in the probability of being told that one's insurance is not accepted (decreases of 14 and 11 percent of the mean, respectively). Finally, people also report using health care services more when Medicaid payments increase. In the full sample (Panel 1 of Table 3), a $10 increase in physician reimbursement is associated with a 0.29 percentage point (1.5 percent) increase in the probability that respondents covered by Medicaid went to a doctor's office in the past two weeks.

In addition to improved access, increases in Medicaid reimbursement rates are associated with improvements in self-reported health among the program's beneficiaries. As shown in the top panel of Table 3, a $10 increase in physician reimbursement is associated with a 0.3 percentage point (1.7 percent) decrease in the probability of reporting fair or poor health and a 0.58 percentage point (1 percent) increase in the probability of reporting very good or excellent health.

To get a sense of what these magnitudes imply for the experience of a typical state under the primary care rate increase, we consider the implied changes associated with an increase in payments of $40—the average increase in payments across states from the third quarter of 2012 to the first quarter of 2013.[11] Multiplying the point estimates in Table 3 by four, we see that an increase of $40 in physician reimbursement is associated with a 6 percent increase in the probability of Medicaid beneficiaries having visited a doctor's office in the past two weeks, a 6.8 percent decrease in the probability of being in fair or poor health, and an increase of 4 percent in the probability of being in very good or excellent health. Applying the same calculations to the access measures additionally suggest that the primary care rate increase eliminated parents having trouble finding doctors for their Medicaid-covered children in the average state, and approximately halved these difficulties for adult beneficiaries.

While we find strong evidence that increased physician reimbursement under Medicaid is associated with improved access and health among Medicaid beneficiaries, there is little evidence of spillovers on the privately insured. The last three columns of Table 3 present the analogous estimates for privately insured respondents, who may be indirectly affected by Medicaid patients becoming relatively more attractive to doctors. However, this does not appear to be the case, at least on a large scale. There is no change in access measures or health outcomes among the privately insured when Medicaid payments to primary care doctors increase, with the exception of parents reporting slightly more trouble finding a doctor for their children (an increase of 0.12 percentage points, significant at the ten percent level). Not only are the coefficients nearly all statistically insignificant despite much larger sample sizes, but the point estimates are also generally very small.

Finally, the improvements in access for Medicaid beneficiaries appear to translate into improved school attendance for children. Column 3 of the second panel of Table 3 shows that a $10 increase in physician reimbursement is associated with a statistically significant decrease in the probability of being chronically absent of 0.4 percentage points, for children covered by Medicaid (a decrease of 8 percent of the mean). However, there is no corresponding decrease in the number

[11] The average change in payments between the last quarter of 2012 and the first quarter of 2013 is $39; the median is $36.

of days missed of work for adults. These differential findings for adults and children may reflect differences in the immediate consequences of missing work versus school, as well as differences in the characteristics of the adult and child Medicaid populations.

Table 4 shows that the association between Medicaid fees and school attendance we documented in the NHIS is also present in a completely different dataset: educational achievement data from the National Assessment of Educational Progress. While the NAEP data does not allow us to look separately at children that are covered by Medicaid, we can narrow the sample to children who are eligible for free lunch. While the requirements are not identical, both free school lunch and Medicaid are means-tested programs, and likely have substantial overlap. For low income children in the 4th grade, an increase in Medicaid primary care physician payments of $10 is associated with 0.4 to 0.5 percentage points fewer chronically absent children (now measured as three or more days missed in the past month; see 4, column 1). A similar pattern is present in grade 8 for free lunch eligible children, though the point estimates are less precise (column 2). Columns 3 and 4 show that no such pattern is present for higher income children, who are not eligible for free lunches, and are unlikely to be covered by Medicaid. Table 5 shows that the fraction of low income children with zero absences in the past month increased consistently for grade 4, and again we find a similar, less precise response for older children.

The improvements in absence rates shown in Tables 4 and 5 are consistent with higher Medicaid fees improving health outcomes for children to the point that they missed fewer days of school, and thus shifted the distribution of absences towards zero. Absences in 8th grade show a qualitatively similar, although substantially less precise, pattern. The larger effects in 4th grade relative to 8th grade may reflect the fact that absences for younger children are more closely tied to health status,whereas absences for older children are more likely to be for non-health-care related reasons, such as truancy.

Results from both the NHIS and NAEP data suggest that improvements in school attendance associated with increased access to primary care come at least partly from children at the high end of the absence distribution: those missing 3+ days of school per month, or two weeks or more per year. Chronic absenteeism is known to be a problem in low income populations, and our results suggest that lack of adequate primary care is an important contributing factor (Chang and Romero, 2008).

While increasing physician reimbursement is strongly associated with reductions in school absenteeism, we find little immediate effect on test scores (see Table A.10). In 4th grade, where we found the strongest improvements in attendance, there is no evidence that Medicaid fees are related to math or reading test scores. In 8th grade, there is some suggestive evidence that higher Medicaid fees are associated with very slightly improved test scores, but only for math. It is possible that 8th grade math is particularly sensitive to either attendance or health, and that missing fewer days during this period or being healthier and better able to concentrate could help test scores.[12] However, the point estimates are very small and the pattern is not consistent across tests and grades, suggesting that there is little evidence of immediate improvements on test scores due to better health care access.

The Fee Increase and Duration Expectations

One potential drawback to using physician payments as a policy instrument to influence physician behavior is the possibility that providers may not respond to a change in payments whose duration they view as uncertain. Physician-patient relationships tend to last for many years, so if providers expect payment increases to be temporary they may hesitate to take on new patients; uncertainty over the duration of payment increases could erode such a policy's effectiveness.[13] For example, uncertainty over duration could cause the primary care rate increase to have a smaller effect on the behavior of a forward-looking doctor who expects the fee increase to last two years than on the behavior of a physician who expects the higher rate to persist indefinitely. Given that the

[12] Currie and Thomas (2001) find that success in math is more dependent on what happens in school than success in reading, which is consistent with only finding effects on math scores.

[13] Data from the Medicare Current Beneficiary Survey suggests that a third of Medicare beneficiaries have been seeing their usual doctors for over 10 years, and half of beneficiaries have been with their primary doctor for over 5 years (Donahue et al., 2005). Similar patterns were found in a survey conducted in non-metropolitan counties of eight southern US states, where over half of respondents reported being with their primary physician for more than 5 years (Parchman and Burge, 2004).

duration of the fee increase was unknown when it was enacted, we can directly examine the extent to which heterogeneity in beliefs about the expected duration of increased payments—proxied by assuming perfect foresight—impacted the policy's effectiveness.

Perhaps surprisingly, we find little evidence that the effect of the Medicaid fee increase differed across states that did and did not extend the increased payments. In Table A.3, we interact Medicaid payments with an indicator for whether states extended the higher payments into 2015. For the access measures, there is no difference in responses to payment changes between doctors living in states that did and did not extend the fee boost beyond 2014. The fact that improvements in access were not greater in states that ultimately extended the higher payments seems to indicate that physicians place little weight on their expectations of the duration of a fee increase—perhaps because it is difficult to forecast political outcomes such as whether the fee boost would be maintained in 2015. In the case of the primary care fee increase, it was not announced until late 2014 that the increased payments would not receive federal funding in 2015, and the states that chose to extend the increased payments show diversity in geography, demographics, and political affiliations (see Figure A.2). There is also no significant difference between extension and non-extension states for self reported health (though we do find that days of work and school missed both show evidence of a larger effect in states that ultimately extended the payments).

5 Robustness

5.1 The Fee Increase and the 2014 Medicaid Expansion

Many aspects of the US health care system were in flux as the ACA began to go into effect, which covers most of the time period we study. Most relevant for this paper, Medicaid was expanded in 2014, making low-income, childless adults eligible for the first time in many states. The 2014 Medicaid expansion complicates our analysis of the primary care rate increase for two reasons. First, the timing is similar, and thus we need to show that our results are not confounded by the Medicaid expansion. Second, the Medicaid expansion resulted in large changes in the composition of Medicaid beneficiaries in some states. From a policy perspective, it would be useful to know whether the improvements in access and health that we observe differ between the newly eligible or traditionally eligible Medicaid populations.

Perhaps the best evidence that our results reflect the effects of changing payments and are not confounded by the Medicaid expansion is that many of our strongest results are for child outcomes, and children were relatively unaffected by the 2014 expansions. However, we can also look directly at the timing by comparing the effect of changing Medicaid rates on access and health across different time periods. In particular, we estimate our main specification excluding the overlap with the Medicaid expansion (2009-2013), isolating the variation from the ACA rate increase (2012-2014), and using the variation from the reverse experiment as the rate increase was phased out in some states (2013-2015). Figures 7 and 8 compare the point estimates from our main specification with those using different time periods for the full sample and the adult subsample, respectively (analogous results for children can be found in Figure A.3). The point estimates across the different time periods are remarkably consistent with our main results.

We also attempt to look at the timing directly in event time. As the primary care fee increase turned on for all states simultaneously, there is no control group in 2013 and 2014. However, we expect the effects generally to be larger among states that saw a bigger payment increase than in states that saw a smaller payment increase. Thus, we divide states into more and less affected groups at the median by the size of the fee increase experienced from 2012 to 2013. Figure A.5 plots the difference in the quarter dummy coefficients for these two groups from a specification which does not include the fee variable, but is otherwise the same as equation 2. As payments vary at the state level, splitting the sample sharply reduces our identifying variation, and we lack the power to statistically differentiate the quarter dummy estimates in high fee increase states from low fee increase states. Still, Figure A.5 shows suggestive evidence that the trends in outcomes were similar between these groups before 2013, and diverged after the fee increase was introduced in 2013.

In order to examine whether changes in physician payments have heterogeneous impacts across new and previously eligible Medicaid beneficiaries, we cut the sample in several ways. For a coarse perspective on the Medicaid expansion, we look separately at states that did and did not expand Medicaid—though as mentioned above, this strategy reduces our identifying variation. In addition, we look separately at adults with and without children, as childless adults experienced the largest increases in Medicaid eligibility under the ACA.

Figures 7 and 8 compare the point estimates from our main results with those from running the same specification on these different subsamples. Again, the first order result is that the point estimates are broadly consistent across subsamples, and the estimates are not statistically different from the full sample point estimates or each other. If anything, it appears that the newly Medicaid eligible—as proxied by childless adults—experience the largest increases in office visits and the largest decreases in reports of fair or poor health. This may reflect the fact that many adults who became newly eligible for health insurance under the Medicaid expansion transitioned from an uninsured state, and therefore had both built up a stock of poor health and had postponed seeing doctors. The point estimates for expansion states also tend to be slightly larger than for states that did not expand Medicaid, though the differences are not statistically significant. Finally, the estimates for children are also similar across states that did and did not expand Medicaid,which is reassuring, as poor children did not experience a compositional change after the Medicaid expansions (Figure A.3).

5.2 Robustness of the fee variable

While our data represents the most comprehensive set of Medicaid primary care payment data of which we are aware, they are not perfect. The main weakness of our payment data comes from

Medicaid managed care. We believe this paper represents a step forward with respect to the literature by incorporating managed care payment rates and utilizing them in the analysis. However, as discussed previously, we do not observe the exact payments made to doctors by Medicaid managed care organizations. Instead, we use state-level Medicaid fee-for-service to managed care payment ratios for primary care services in 2010 published in a GAO report (Yocom, 2014) to back out the managed care payment levels. Unfortunately, these fee-for-service to managed care payment ratios are only available for 20 states. In our main analysis, we use use the median payment ratio to impute Medicaid manage care payments for states which do not appear in the report. In Appendix D, we explore the robustness of our main results to alternative constructions of the payment variable.

In Table A.5, we explore the sensitivity or our estimates to measurement error around Medicaid managed care payment levels by reestimating our main results using the mean instead of the median to impute the share in Medicaid managed care. In Table A.6, we reestimate our main results using the subsample of states for whom we know the exact Medicaid managed care share from Yocom (2014). As can be seen in Tables A.5 and A.6, our results are robust to different ways of treating Medicaid managed care. Narrowing the sample to just the states listed in the GAO report decreases the power of our fee variable; nevertheless, the estimated coefficients are similar in magnitude to our main result. Using the average payment ratio rather than the median to impute managed care payment rates has very little effect on the magnitude or precision of our estimated coefficients. The point estimates for these alternative payment variables are also plotted in Figures 7, 8, and A.3 for easy comparison to our preferred estimates.

5.3 Alternative empirical specification: difference-in-difference

In our preferred empirical specification, we run all regressions separately on Medicaid beneficiaries and those covered by private insurers. We look separately at these two groups, rather than using the privately insured as a control group, as changes in the treatment of Medicaid beneficiaries could spill over into the treatment of those covered by other insurers. If the increase in reimbursement rates for treating Medicaid beneficiaries caused doctors to spend more time with their Medicaid population and less time with other patients, a difference-in-difference strategy would both miss this negative spillover and potentially over-estimate the magnitude of the effects of the payment change on outcomes for Medicaid beneficiaries. In fact, we find some evidence of this in Table 3, as parents of children with private insurance report having a slightly harder time finding doctors when Medicaid payments increase. However, as this strategy has been used by other papers in the existing literature on the Medicaid payment changes (Atherly and Mortensen, 2014; Callison and Nguyen, 2017; Shen and Zuckerman, 2005), we show difference-in-difference estimates for comparison.

In particular, we estimate the following regression:

$$\begin{aligned} Outcome_{icst} &= \beta_0 + \beta_1 Fee_{st} + \beta_2 Medicaid_{icst} + \beta_3 Fee_{st} * Medicaid_{icst} \\ &\quad + \gamma X_i + \delta Z_{ct} + \lambda_s + \lambda_t + \epsilon_{icst} \end{aligned} \tag{4}$$

where $Medicaid_{icst}$ is an indicator for Medicaid beneficiaries, and $Fee_{st} * Medicaid_{icst}$ is an interaction between the Medicaid indicator and the state-year payment variable. All individual and county level controls, as well as state and quarter-year fixed effects included in equation 2 are also included. The sample used here is the combination of the Medicaid and privately insured samples used in our main results. Table A.11 shows that the pattern of results in the difference-in-difference specification is similar to those found for Medicaid beneficiaries in Table 3. The similarity is not surprising, given the minimal evidence of spillovers on the privately insured. The main difference between the two specifications is the magnitude of some coefficients. However, when viewed as a percentage of the combined population mean, the magnitudes are fairly similar. Also, the decrease in days of school missed does not show up in Table A.11.

6 Conclusion

The intention of the Medicaid primary care rate increase was to increase access to primary care services for disadvantaged populations in the US. Without ongoing access to primary care services, existing chronic conditions go untreated and essential preventive services are not provided. In addition to the direct welfare losses that result from inadequate care, conditions that are left untreated at the primary care level often lead to expensive yet preventable emergency situations, adding to the rapid growth in health care spending (Alexander et al., 2017). Our results suggest that the ACA's strategy of increasing primary care reimbursement rates was successful in both expanding access to care and improving health outcomes among the Medicaid population. Conversely, evidence from the rate increase expiring in 2015 suggests that cutting Medicaid payments to providers can make it significantly harder for low income Americans to find doctors willing to treat them.

An outstanding question which we are unable to answer in this paper is how exactly doctors respond to changing reimbursement rates. As we do not find a clear pattern of negative effects of the fee boost on the privately insured, it does not appear that physicians primarily respond by substituting away from the non-Medicaid population, at least on the extensive margin. How then are physicians able to see more patients? Neprash (2017) finds preliminary evidence that physicians already participating in Medicaid respond to higher payments by increasing both the total number of appointments and the number of unique patients. One way physicians could see more patients is by decreasing appointment length, which could result in negative health consequences if providers are rushed and diagnoses are missed. To the extent that this response would be reflected in the outcome measures used in this paper, however, our results do not support this mechanism; we find no evidence that higher payments for Medicaid are associated with worse outcomes for the privately insured. On the other hand, perhaps doctors were previously treating their privately insured patients too intensely, in which case outcomes of the privately insured could be unaffected by reallocating time to Medicaid beneficiaries.

While we cannot look at physician labor supply directly in our data, we can divide counties by those with and without shortages of primary care providers, as defined by by the Health Resources and Services Administration. If increasing labor supply was the main margin of response, we would expect the higher fees to have no impact in areas with primary care provider shortages—where providers presumably have little scope to take on more patients. However, we find no evidence of differing effects between counties that are and are not designed as a primary care shortage area (see Table A.4). There are many ways physicians could treat more patients: practices could be expanded by increasing the hours of non-physician providers, decreasing appointment length, having doctors work longer hours, or take fewer breaks. While nailing down the exact mechanism of the physician response is interesting in its own right, our results show that increasing the generosity of Medicaid by itself is enough to improve access to care and health of low income populations.

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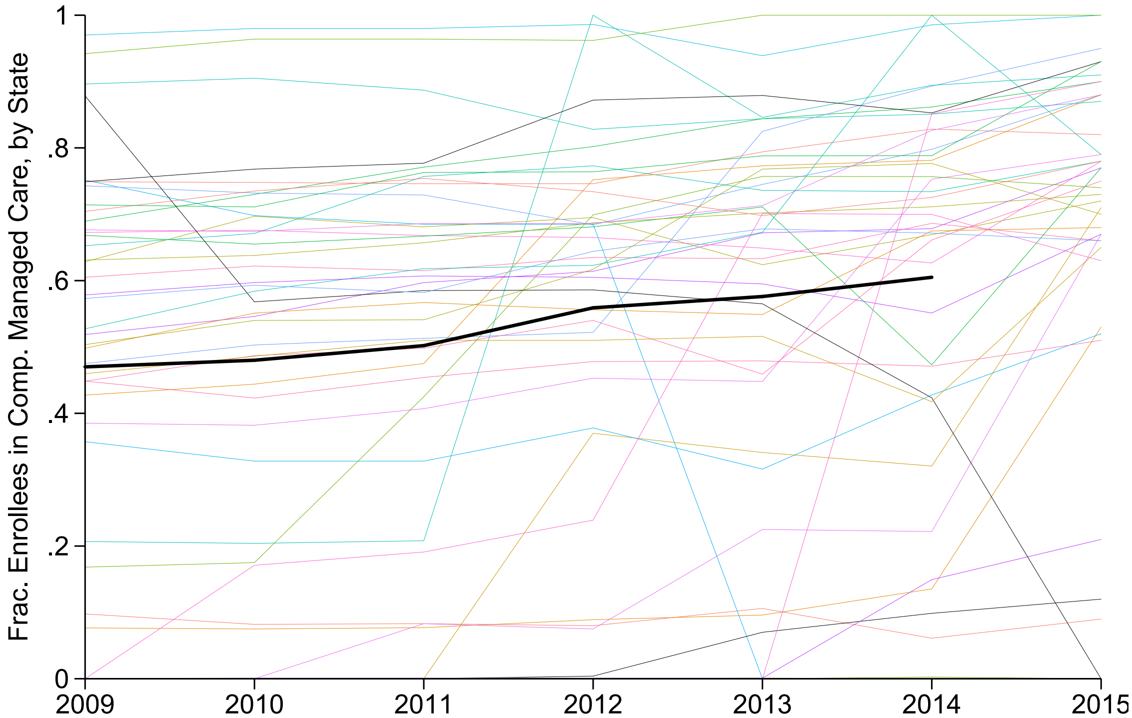
7 Figures

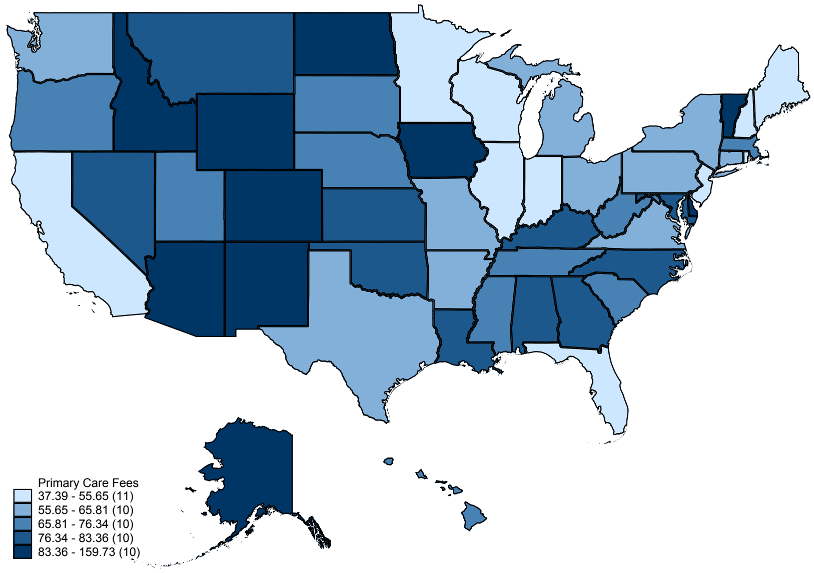
Figure 1: State-Level Medicaid Managed Care Penetration over Time



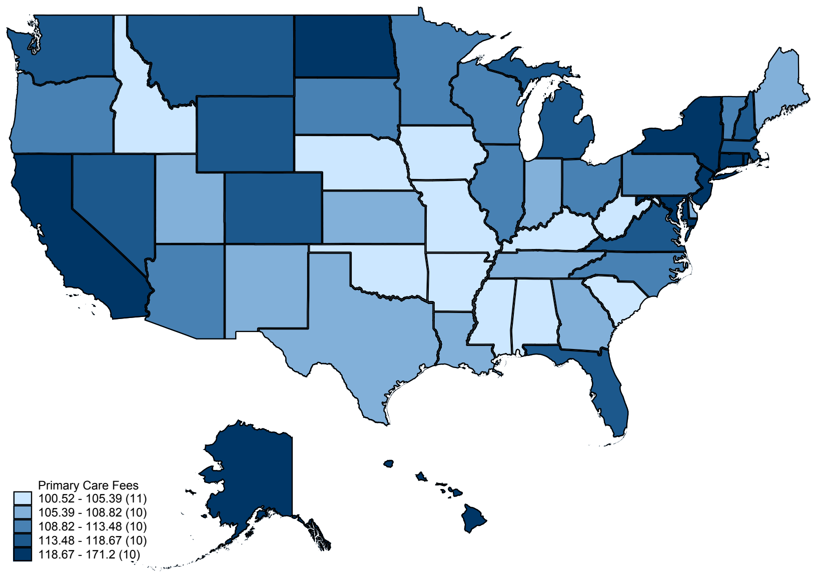
Notes: The above figure depicts the fraction of Medicaid beneficiaries enrolled in comprehensive risk-based managed care in each state from 2009 to 2015. The black line depicts the national average. Data for 2009 through 2014 come from CMS; data for 2015 comes from the Henry J. Kaiser Family Foundation. In 2014, 11 states had less than one percent of their Medicaid beneficiaries enrolled in these plans: Alabama, Alaska, Arkansas, Connecticut, Idaho, Maine, Montana, North Carolina, Oklahoma, South Dakota, and Wyoming. In the same year, nine states had more than 85 percent of their Medicaid beneficiaries enrolled in managed care plans: Arizona, Delaware, Hawaii, Kansas, Kentucky, New Hampshire, New Jersey, Tennessee, and Washington.

Figure 2: State-Level Medicaid Fees for New Patient Primary Care Services

2009

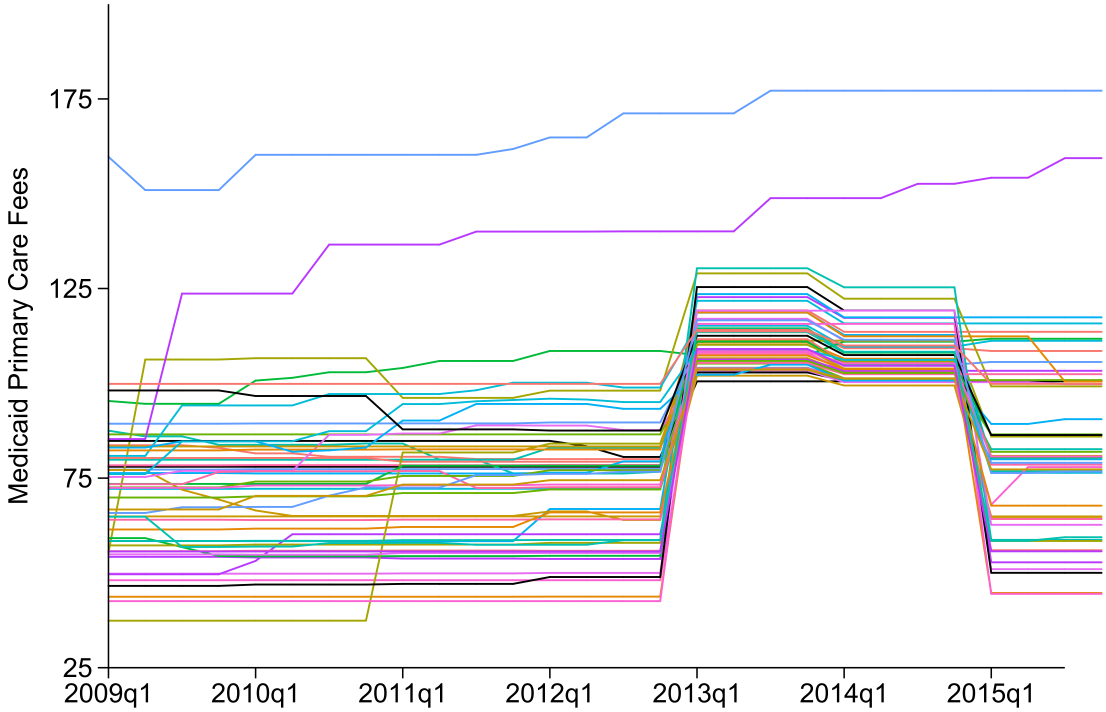


2013



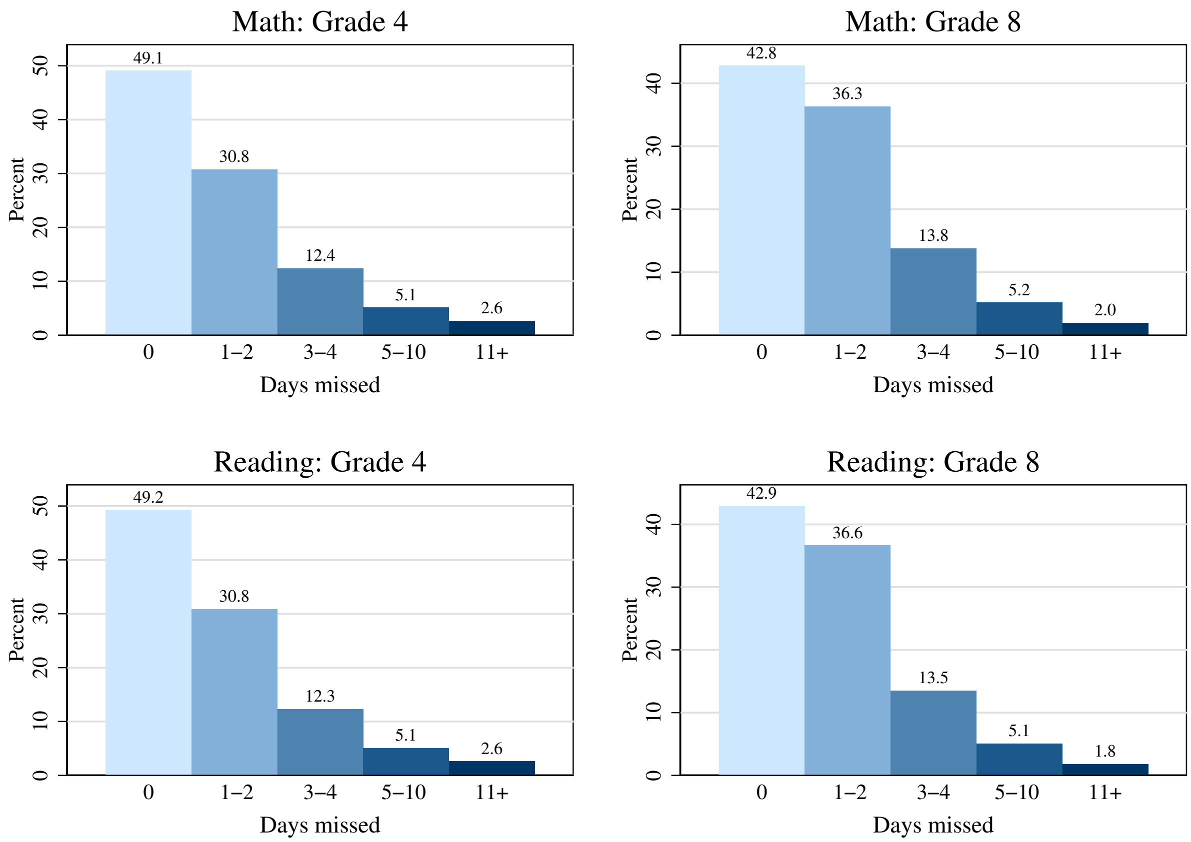
Notes: The above maps depict yearly averages of Medicaid payments for each state in 2009 and 2013. The fees used are weighted averages of Medicaid fee-for-service and managed care payments for new patient management and evaluation services, where the weights are the fraction of beneficiaries enrolled in each type of plan at the state-year level.

Figure 3: State-Level Medicaid Fees for New Patient Primary Care Services over Time



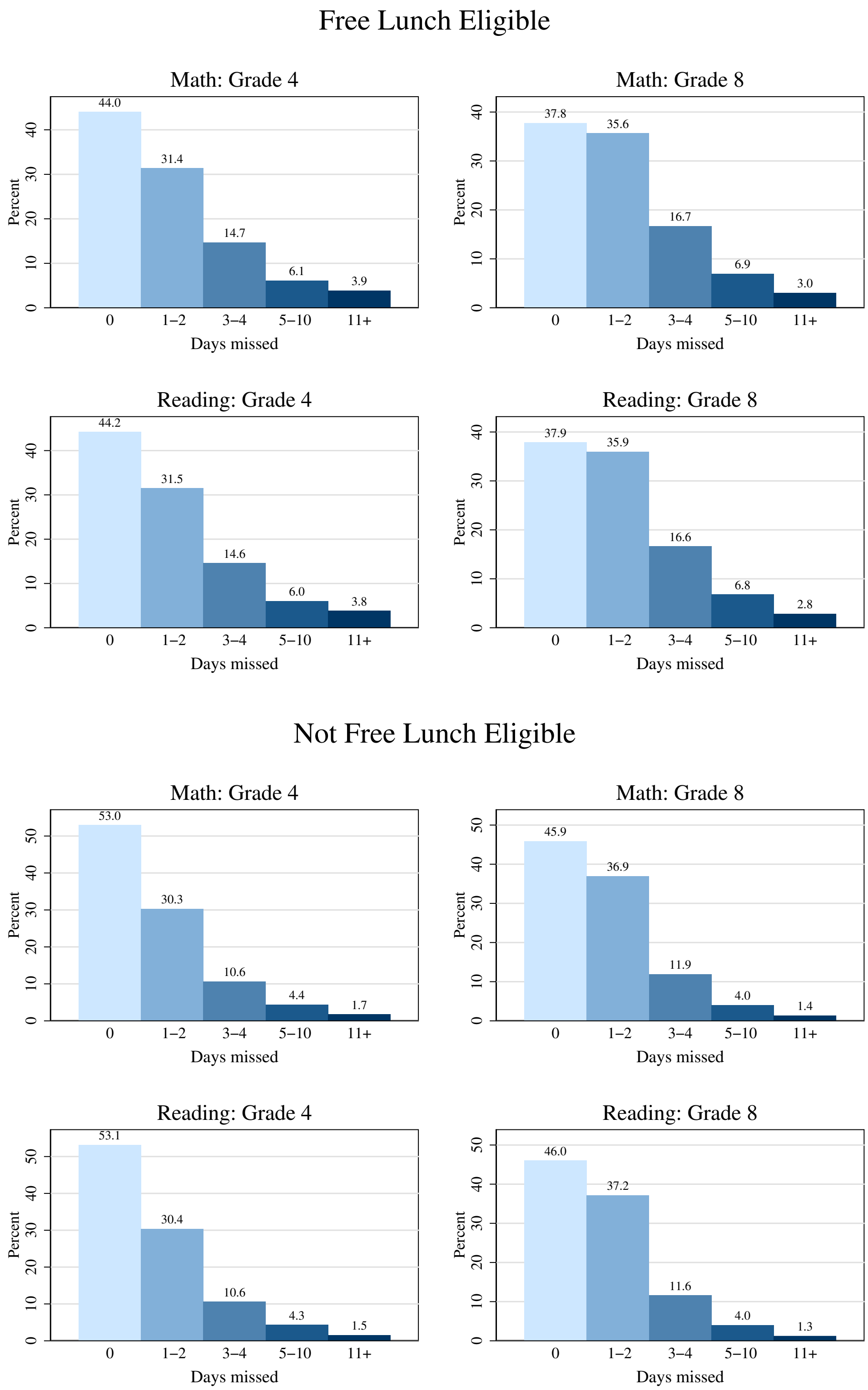
Notes: The above figure depicts quarterly averages of Medicaid payments for each state from 2009 to 2016. The fees used are weighted averages of Medicaid fee-for-service and managed care payments for new patient management and evaluation services, where the weights are the fraction of beneficiaries enrolled in each type of plan at the state-year level. The top two lines are Alaska (1) and North Dakota (2); the bottom two lines in 2009 are New Hampshire (50) and Minnesota (51).

Figure 4: Distribution of School Absences by Grade and Subject



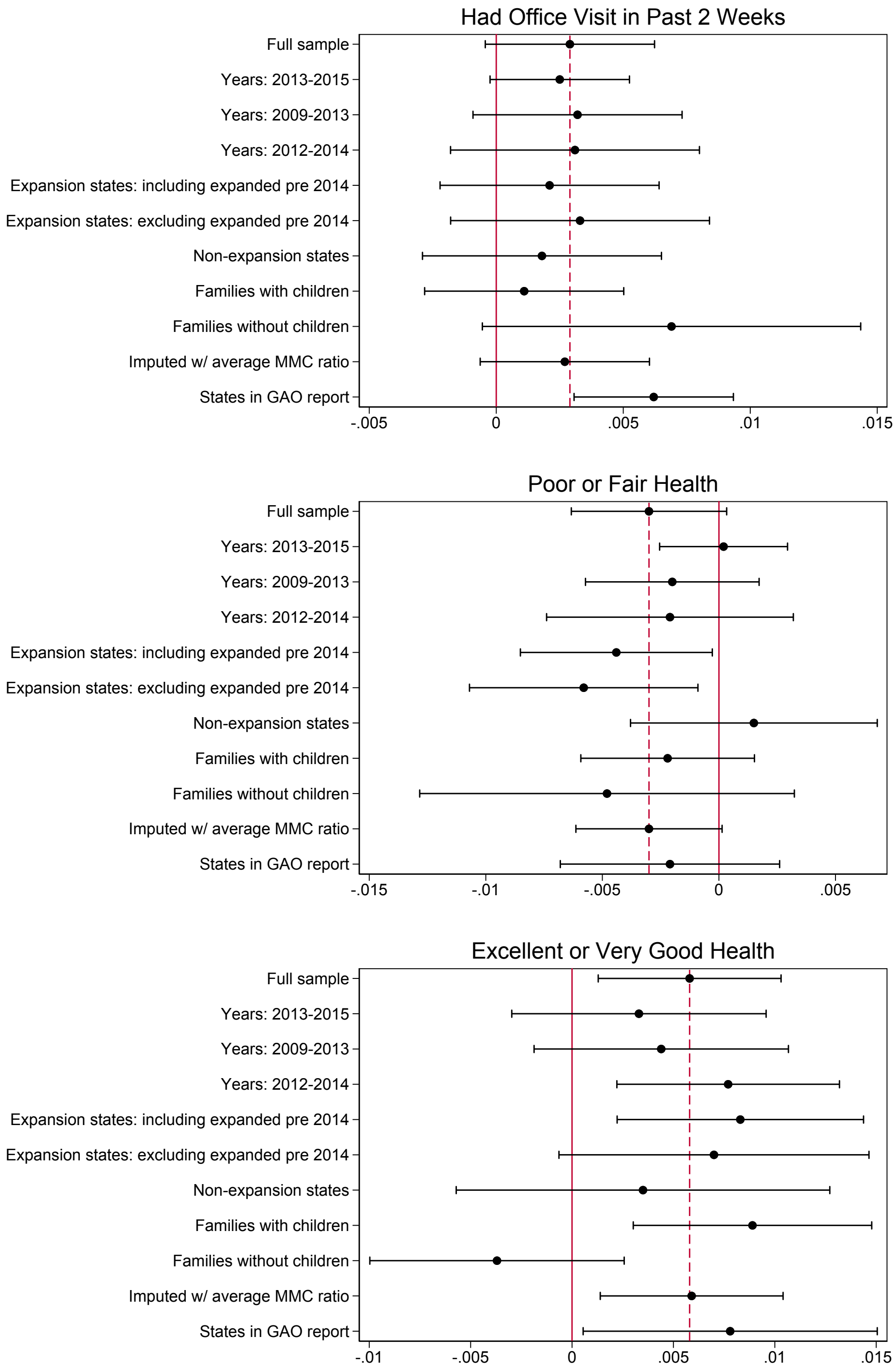
Notes: The above figures display the average percent of students who had missed 0, 1-2, 3-4, 5-10, or 11+ days in the month preceding their state assessment tests from 2009 to 2013. Data comes from the National Assessment of Educational Progress.

Figure 5: Distribution of School Absences by Free Lunch Eligibility



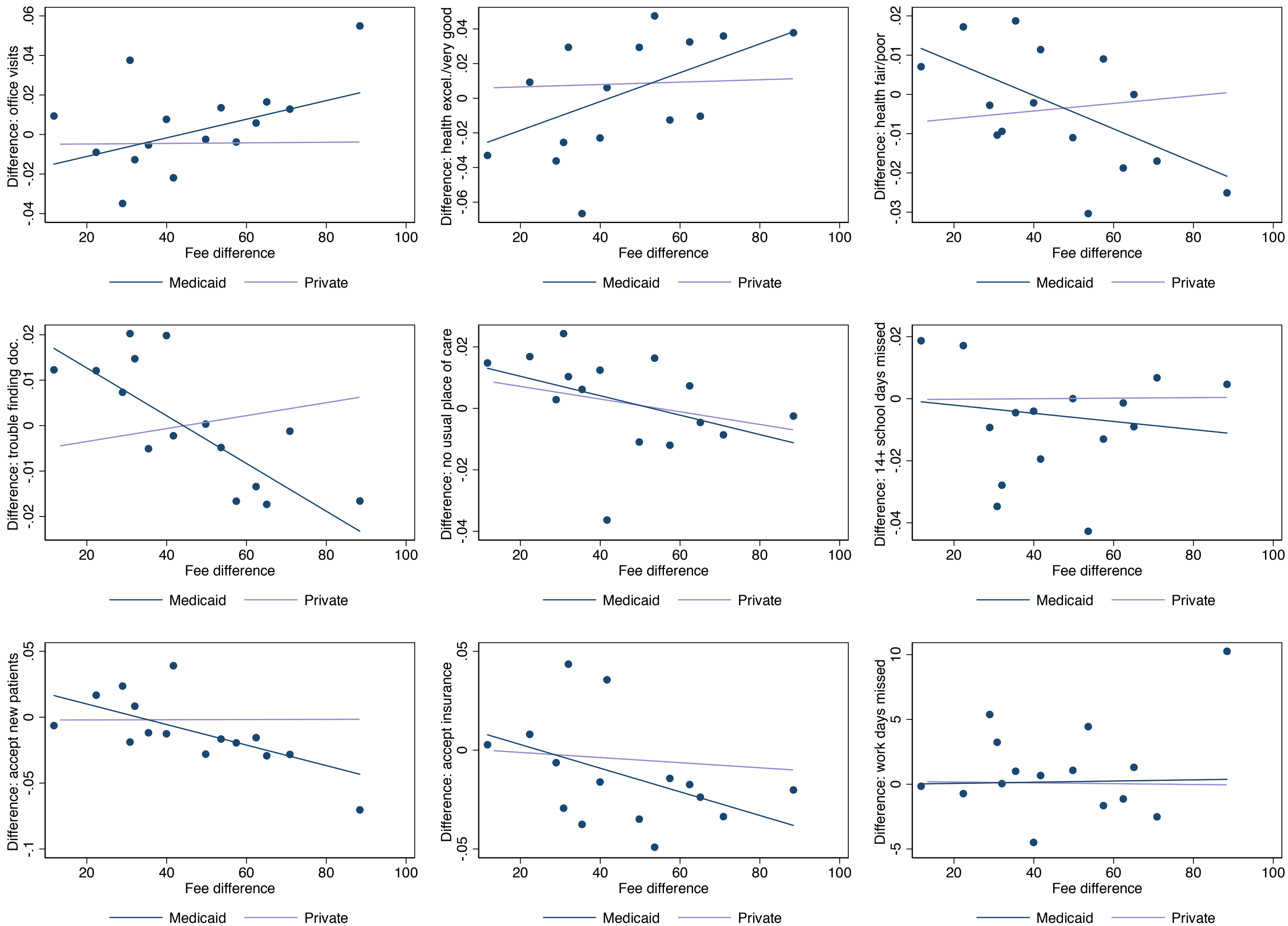
Notes: The above figures display the average percent of students who had missed 0, 1-2, 3-4, 5-10, or 11+ days in the month preceding their state assessment tests from 2009 to 2013. Data comes from the National Assessment of Educational Progress.

Figure 7: Heterogeneous Effects of Physician Reimbursement



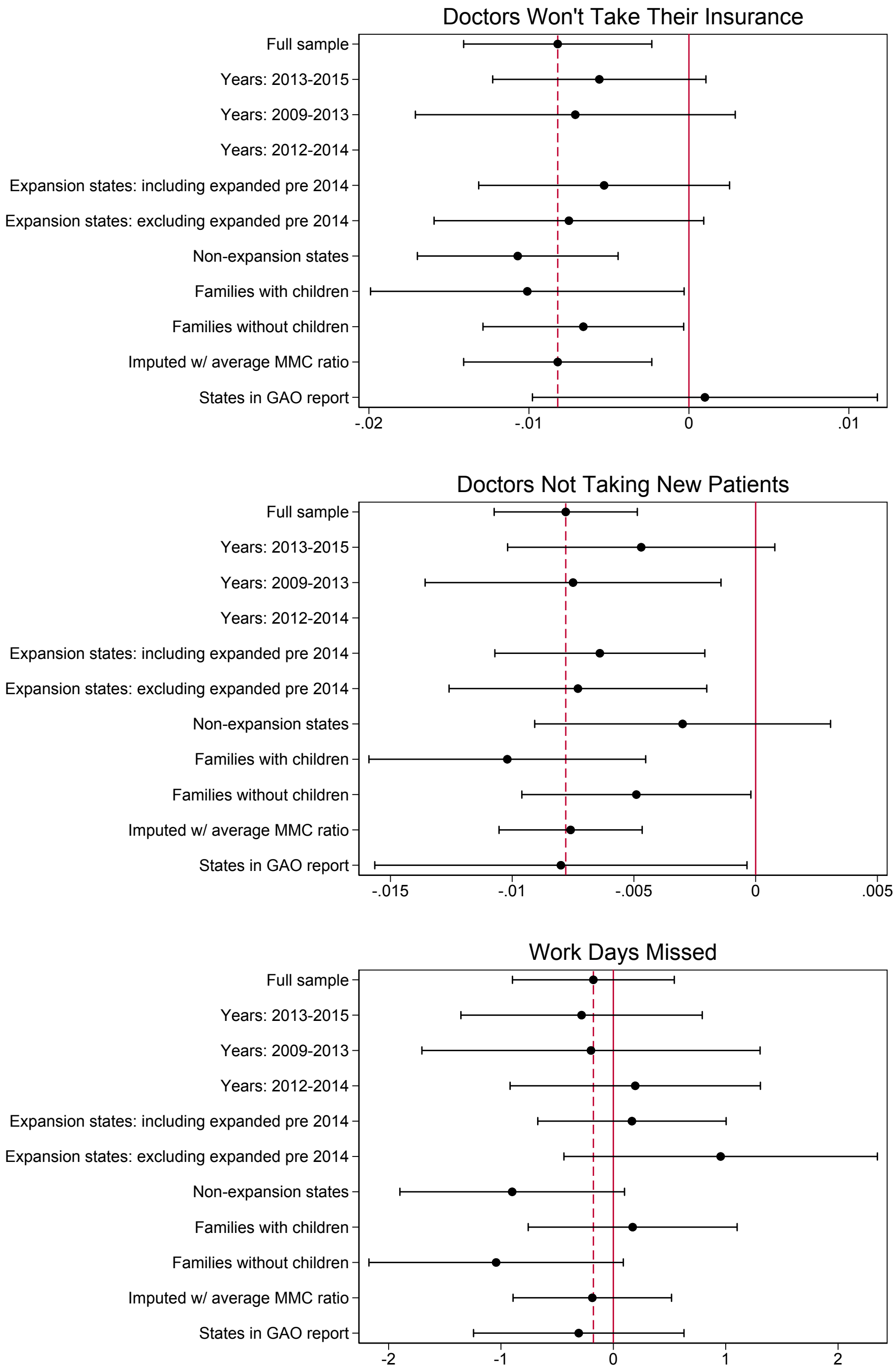
Notes: Each dot in the above figures depicts the estimated effect on a $10 increase in physician reimbursement under Medicaid for the subsample or alternative specification listed on the y-axis. Each coefficient comes from a separate regression. 95% confidence intervals for each coefficient are also reported. The dashed vertical lines show the coefficients in the full sample (as reported in Table 3).

Figure 6: Before-After Differences by Size of Fee Increase



Notes: the figures plot the average change in the outcomes at the state level between 2011-2012 (before) and 2012-2013 (after)..

Figure 8: Heterogenous Effects of Physician Reimbursement: Adult Subsample



Notes: Each dot in the above figures depicts the estimated effect on a $10 increase in physician reimbursement under Medicaid for the subsample or alternative specification listed on the y-axis. Each coefficient comes from a separate regression. 95% confidence intervals for each coefficient are also reported. The dashed vertical lines show the coefficients in the full sample (as reported in Table 3).

8 Tables

Table 1: Summary Statistics: Outcome Measures

		Medicaid	Private
Full Sample	Office visit in past 2 weeks	0.196	0.174
	N	95,736	337,717
	Fair or poor health	0.174	0.061
	N	95,786	338,114
	Excellent or very good health	0.566	0.728
	N	95,786	338,114
Child Subsample	Trouble finding a doctor	0.021	0.008
	N	16,786	24,454
	No usual place of care	0.028	0.020
	N	21,249	34,261
	14+ school days missed	0.054	0.028
	N	14,630	27,909
Adult Subsample	Don't accept new patient	0.055	0.016
	N	14,806	80,409
	Don't accept insurance	0.075	0.022
	N	14,805	80,399
	Work days missed	4.927	3.731
	N	6,295	77,571

Notes: The reported statistics are weighted using the sample weights provided in the NHIS. The exact survey questions used are outlined in Appendix A.1. Fewer children report days of missed school relative to other child outcomes since a child must be at least five years old to be asked this question. Similarly, only adults with employment histories are asked how many days of work they missed in the past year.

Table 2: Summary Statistics: Individual and County Controls

	All	Medicaid	Private
Avg. Medicaid new patient fee	80.1	81.7	80.0
Individual level controls			
Welfare	12.7	48.3	3.5
Married	58.2	40.0	66.6
Live with partner	5.5	4.9	4.5
Pct black	13.2	25.2	9.7
Pct Hispanic	16.7	29.6	10.1
One adult, no children	13.0	8.8	12.5
Multiple adults, no children	34.9	14.1	37.8
One adult, 1+ children	6.1	18.9	3.8
Multiple adults, 1+ children	46	58.1	45.9
Pct homeowner	33.4	64.5	22.3
Pct not homeowner	64.8	34.2	76.0
Pct income:poverty line: <1	13.8	47.5	3.6
Pct income:poverty line: 1-1.99	16.6	28.5	9.7
Pct income:poverty line: 2-3.99	25.0	10.9	28.6
Pct income:poverty line: 4+	29.9	2.5	43.6
Pct family w/ no children	47.9	22.9	50.3
Pct family w/ 1 child	17.6	19.3	17.9
Pct family w/ 2 children	19.1	24.3	19.7
Pct family w/ 3 children	9.9	18.5	8.6
Pct family w/ 4 children	3.6	9	2.5
Pct family w/ 5+ children	1.9	5.9	1.0
Educ: < high school	13.5	30.7	5.8
Educ: high school/GED	25.5	30.7	21.8
Educ: some college	19.0	17.9	19.4
Educ: assoc. degree	10.7	7.9	12.0
Educ: bachelor's degree	18.1	4.9	24.6
Educ: master/prof/phd	9.7	1.3	13.9
Pct male	48.9	43.9	48.9
Pct not US citizen	6.9	6.2	3.9
Pct US citizen	92.7	93.6	95.9
Average age	37.3	24.2	38.4
County level controls			
Unemployment rate (16+)	8.3	8.7	8.1
Medicaid eligibles	286,546	362,920	255,757
Pediatricians	234	265	222
Primary care doctors	876	969	838
Nurse practitioners	401	447	386
Population	1,126,919	1,284,943	1,050,948
Population density	2,010	3,087	1,834
Hospital beds	3,254	3,750	3,037
Median income	53,749	50,031	55,408
Expansion state (2014)	9.3	11.8	9.6
Observations	603,074	96,128	338,174

Notes: Averages are weighted using the sample weights provided in the NHIS. County-level controls come from the HRSA's Area Resource Files. The percents of the population in the education, income to poverty line ratio, homeowner, and citizenship status bins do not sum to 100 because of missing responses. Missing categories for these variables are additionally included in all regressions.

Table 3: Effects of Physician Reimbursement under Medicaid on Access and Health

Full sample	Medicaid			Private		
	(1) Office Visits	(2) P/F Health	(3) Ex/VG Health	(4) Office Visits	(5) P/F Health	(6) Ex/VG Health
Medicaid fees, in $10	0.0029* (0.0017)	-0.0030* (0.0017)	0.0058** (0.0023)	-0.0008 (0.0010)	0.0002 (0.0006)	0.0018 (0.0017)
Observations	96,017	96,067	96,067	337,506	337,903	337,903
R^2	0.071	00.296	0.232	0.036	0.079	0.138
Mean dep. var.	0.196	0.174	0.566	0.174	0.061	0.729

Child Subsample	Medicaid			Private		
	(1) Trouble finding doctor	(2) No usual place of care	(3) 14+ school days missed	(4) Trouble finding doctor	(5) No usual place of care	(6) 14+ school days missed
Medicaid fees, in $10	-0.0055*** (0.0015)	-0.0037** (0.0018)	-0.0042** (0.0019)	0.0012* (0.0007)	0.0002 (0.0010)	-0.0009 (0.0013)
Observations	16,810	21,290	14,630	26,443	34,246	27,909
R^2	0.016	0.022	0.027	0.007	0.029	0.015
Mean dep. var.	0.021	0.031	0.054	0.008	0.021	0.028

Adult Subsample	Medicaid			Private		
	(1) Don't accept new patient	(2) Don't accept insurance	(3) Days missed	(4) Don't accept new patient	(5) Don't accept insurance	(6) Days missed
Medicaid fees, in $10	-0.0078*** (0.0015)	-0.0082*** (0.0030)	-0.1778 (0.3674)	0.0005 (0.0006)	-0.0007 (0.0007)	0.1037 (0.1129)
Observations	14,855	14,854	6,321	80,351	80,341	77,548
R^2	0.037	0.040	0.075	0.006	0.009	0.009
Mean dep. var.	0.055	0.075	4.929	0.016	0.022	3.730

Notes: Observations are at the individual level; standard errors are clustered by state. All regressions include state and quarter-year fixed effects, and all individual and county-level controls included in Table 2 (age enters into the regressions as 5-year bins). Regressions are weighted using the sample weights provided in the NHIS.

Table 4: Effects of Physician Reimbursement under Medicaid on School Absences: Chronic Absences

Math

	Free lunch eligible		Free lunch ineligible	
	(1) Grade 4 3+ days missed	(2) Grade 8 3+ days missed	(3) Grade 4 3+ days missed	(4) Grade 8 3+ days missed
Medicaid fees, in $10	-0.493***	-0.208	-0.197	-0.271
	(0.133)	(0.164)	(0.171)	(0.165)
Observations	150	150	150	143
R^2	0.790	0.827	0.728	0.808
Mean dep. var.	24.627	26.660	16.713	17.336

Reading

	Free lunch eligible		Free lunch ineligible	
	(1) Grade 4 3+ days missed	(2) Grade 8 3+ days missed	(3) Grade 4 3+ days missed	(4) Grade 8 3+ days missed
Medicaid fees, in $10	-0.447***	-0.449**	-0.113	-0.138
	(0.145)	(0.196)	(0.144)	(0.115)
Observations	150	150	150	145
R^2	0.805	0.825	0.724	0.793
Mean dep. var.	24.387	26.253	16.473	16.890

Notes: Observations are at the state-year level; standard errors clustered by state. All regressions include state and year fixed effects. Data is from 2009, 2011, and 2013.

Table 5: Effects of Physician Medicaid Reimbursement on Absences: No days missed

Math

	Free lunch eligible		Free lunch ineligible	
	(1) Grade 4 0 days missed	(2) Grade 8 0 days missed	(3) Grade 4 0 days missed	(4) Grade 8 0 days missed
Medicaid fees, in $10	0.462***	0.484**	0.431*	0.200
	(0.142)	(0.195)	(0.229)	(0.207)
Observations	150	150	150	150
R^2	0.867	0.866	0.772	0.835
Mean dep. var.	44.000	37.760	52.967	45.887

Reading

	Free lunch eligible		Free lunch ineligible	
	(1) Grade 4 0 days missed	(2) Grade 8 0 days missed	(3) Grade 4 0 days missed	(4) Grade 8 0 days missed
Medicaid fees, in $10	0.429***	0.343	0.286	0.268
	(0.148)	(0.265)	(0.193)	(0.184)
Observations	150	150	150	150
R^2	0.866	0.856	0.784	0.861
Mean dep. var.	44.207	37.880	53.133	46.027

Notes: Observations are at the state-year level; standard errors clustered by state. All regressions include state and year fixed effects. Data is from 2009, 2011, and 2013.

Appendix: for Online Publication

A Data Appendix

A.1 Outcomes

Table A.1: Overview of Data Sources for Outcome Measures

Outcome	Data Source	Years Available	Look Back Period	Timing of Explanatory Variable	Sample
Office visit	NHIS	2009-2015	Past 2 weeks	Avg. fee in interview quarter	Full sample; all children
Exellent/v. good health	NHIS	2009-2015	Past 2 weeks	Avg. fee in interview quarter	Full sample; all children
Fair/poor health	NHIS	2009-2015	Not specified	Avg. fee in interview quarter	Full sample; all children
Trouble finding doctor	NHIS	2011-2015	Past 12 months	Avg. fee over past 12 months	Child subsample
No usual place of care	NHIS	2009-2015	Not specified	Avg. fee over past 12 months	Child subsample
Days of school missed	NHIS	2009-2015	Past 12 months	Avg. fee over past 12 months	Child subsample
Don't accept new patient	NHIS	2011-2015	Past 12 months	Avg. fee over past 12 months	Adult subsample
Don't accept insurance	NHIS	2011-2015	Past 12 months	Avg. fee over past 12 months	Adult subsample
Days of work missed	NHIS	2009-2015	Past 12 months	Avg. fee over past 12 months	Adult subsample
Test scores	NAEP	2009, 2011, 2013	Testing occurs in Q1	Avg. fee in first quarter	4th and 8th grade math and reading
School absences	NAEP	2009, 2011, 2013	30 days before test	Avg. fee in first quarter	4th and 8th grade math and reading

National Health Interview Survey questions

Full Sample

- During the last two weeks, did {person} see a doctor or other health care professional at a doctor's office, a clinic, an emergency room, or some other place? (Do not include times during an overnight hospital stay.) [available 2009-2015]
- Would you say {person's} health in general is excellent, very good, good, fair, or poor? [available 2009-2015]

Child Subsample

- During the past 12 months, did you have any trouble finding a general doctor or provider who would see {sample child} [available 2011-2015]
- Is there a place that {sample child} usually goes when {he/she} is sick or you need advice about {his/her} health? [available 2009-2015]
- During the past 12 months, that is, since {12-month ref. date}, about how many days did {sample child} miss school because of illness or injury? [available 2009-2015]

Adult Subsample

- During the past 12 months, were you told by a doctor's office or clinic that they would accept {sample adult} as a new patient [available 2011-2015]
- During the past 12 months, were you told by a doctor's office or clinic that they would accept {sample adult}'s health care coverage? [available 2011-2015]
- During the past 12 months, about how many days did {sample adult} miss work? [available 2009-2015]

A.2 Medicaid fees

Table A.1: Medicaid Enrollment and Managed Care to Fee-for-Service Payment Ratios

State	Pct. MC to FFS ratio	Enrollees (millions)	Pct. in MC
New Mexico	-6	0.5	73
California	-10	7.3	55
State A	0	-	-
Connecticut	1	0.5	70
Indiana	2	1	68
Arizona	1	1.3	91
Wisconsin	1	1.1	60
New York	4	4.7	67
Georgia	4	1.5	62
Florida	6	2.9	38
Washington	3	1.1	58
Michigan	11	1.8	66
South Carolina	7	0.8	49
Ohio	6	2.1	74
Virginia	7	0.9	59
Pennsylvania	11	2	54
State B	15	-	-
Texas	25	3.8	44
New Jersey	59	1	77
Rhode Island	132	0.2	67

Notes: Data on payment ratios comes from Yocom (2014). Data on Medicaid enrollment comes from CMS.

The fee-for-service fee data used in this project has two components. The augmented primary care fee-for-service rates under the ACA rate increase in 2013 and 2014, and the standard fee-for-service rates applicable between 2009 and 2012. We get both components from each state's Medicaid office. While theoretically we could back out rates for 2013 and 2014 for each state using Medicare rates, due to geographic adjustment factors and state specific idiosyncrasies, we prefer to take both components directly from state Medicaid offices. For 44 states and the District of Columbia, we have no missing data. For the remaining six states, we use the following procedures to impute missing rate information:

- For California and Hawaii, we have the ACA rate information for both years, but we only have standard rates for 2009 and a date in or after 2012. However, in these states the rates did not change between our two data points for regular Medicaid rates. Therefore, we feel confident in the assumption that the standard Medicaid rates were constant across the 2009 to 2012 period.
- New Mexico and Utah, we have the ACA rate information for both years, and most of the standard rate information, but are missing a few months of the standard rates (see Table A.2 below for which months are missing). For these states, we impute the missing months based on the closest month with rate information available.
- For South Dakota, we have the ACA rate information for both years, but only have the 2015 standard Medicaid rates, as rates are not archived. To impute standard rates from 2009 to 2012, we apply the average change in reimbursement rates for neighboring states (MT, ND, MN, IA, NE, WY) over the period. Our results are not sensitive to dropping South Dakota from the analysis.
- For Tennessee, we have no micro-data on reimbursement rates, because the state only uses Medicaid Managed Care. However, we do know that average fees to physicians increased by 44% between 2012 and 2013, when the fee boost went into effect. We impute reimbursement rates for Tennessee by averaging the 2013 and 2014 ACA Medicaid reimbursement rates for neighboring states (MO, KY, VA, NC, GA, AL, MS, AR) and then go backwards from 2013 to 2012 using the fact that fees increased by 44% from 2012 to 2013. We then calculate the average rate of increase for physician fees in the neighboring states from 2009-2012, and apply this rate of change to Tennessee over the same time period.

Table A.2: Overview of Medicaid Rate Data

	2009	2010	2011	2012	2013	2013 ACA	2014	2014 ACA	2015	Notes
AL	✓	✓	✓	✓	✓	✓	✓	✓	✓	
AK	✓	✓	✓	✓	✓	✓	✓	✓	✓	
AZ	✓	✓	✓	✓	✓	✓	✓	✓	✓	
AR	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CA	✓	-	-	-	-	✓	-	✓	✓	Rates same in 2009 and 2015
CO	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CT	✓	✓	✓	✓	✓	✓	✓	✓	✓	
DE	✓	✓	✓	✓	✓	✓	✓	✓	✓	
DC	✓	✓	✓	✓	✓	✓	✓	✓	✓	
FL	✓	✓	✓	✓	✓	✓	✓	✓	✓	
GA	✓	✓	✓	✓	✓	✓	✓	✓	✓	
HI	✓	-	-	-	✓	✓	-	✓	✓	Rates same in 2009 and standard 2013
ID	✓	✓	✓	✓	✓	✓	✓	✓	✓	
IL	✓	✓	✓	✓	✓	✓	✓	✓	✓	
IN	✓	✓	✓	✓	✓	✓	✓	✓	✓	
IA	✓	✓	✓	✓	✓	✓	✓	✓	✓	
KS	✓	✓	✓	✓	✓	✓	✓	✓	✓	
KY	✓	✓	✓	✓	✓	✓	✓	✓	✓	
LA	✓	✓	✓	✓	✓	✓	✓	✓	✓	
ME	✓	✓	✓	✓	✓	✓	✓	✓	✓	
MD	✓	✓	✓	✓	✓	✓	✓	✓	✓	
MA	✓	✓	✓	✓	✓	✓	✓	✓	✓	
MI	✓	✓	✓	✓	✓	✓	✓	✓	✓	
MN	✓	✓	✓	✓	✓	✓	✓	✓	✓	
MS	✓	✓	✓	✓	✓	✓	✓	✓	✓	
MO	✓	✓	✓	✓	✓	✓	✓	✓	✓	
MT	✓	✓	✓	✓	✓	✓	✓	✓	✓	
NE	✓	✓	✓	✓	✓	✓	✓	✓	✓	
NV	✓	✓	✓	✓	✓	✓	✓	✓	✓	
NH	✓	✓	✓	✓	✓	✓	✓	✓	✓	
NJ	✓	✓	✓	✓	✓	✓	✓	✓	✓	
NM	✓	✓	✓	✓	✓	✓	✓	✓	✓	Missing 1/09 - 11/09
NY	✓	✓	✓	✓	✓	✓	✓	✓	✓	
NC	✓	✓	✓	✓	✓	✓	✓	✓	✓	
ND	✓	✓	✓	✓	✓	✓	✓	✓	✓	
OH	✓	✓	✓	✓	✓	✓	✓	✓	✓	
OK	✓	✓	✓	✓	✓	✓	✓	✓	✓	
OR	✓	✓	✓	✓	✓	✓	✓	✓	✓	
PA	✓	✓	✓	✓	✓	✓	✓	✓	✓	
RI	✓	✓	✓	✓	✓	✓	✓	✓	✓	
SC	✓	✓	✓	✓	✓	✓	✓	✓	✓	
SD	-	-	-	-	-	✓	✓	✓	✓	Do not archive rates
TN	-	-	-	-	-	-	-	-	-	All MMC; have Δ from 2012-2013
TX	✓	✓	✓	✓	✓	✓	✓	✓	✓	
UT	✓	✓	✓	✓	✓	✓	✓	✓	✓	Missing 1/09 - 5/09, 7/12 - 12/12
VT	✓	✓	✓	✓	✓	✓	✓	✓	✓	
VA	✓	✓	✓	✓	✓	✓	✓	✓	✓	
WA	✓	✓	✓	✓	✓	✓	✓	✓	✓	
WV	✓	✓	✓	✓	✓	✓	✓	✓	✓	
WI	✓	✓	✓	✓	✓	✓	✓	✓	✓	
WY	✓	✓	✓	✓	✓	✓	✓	✓	✓	

B Results by Duration Expectations

Doctors living in different states may have different expectations about the duration of the payment increase, which may in turn may influence their responses to the fee bump. We therefore consider an additional specification where we allow the impact of changing Medicaid fees to differentially influence outcomes in states where doctors might believe that the fee boost would be extended: states that actually extended the fee boost. That is, we estimate the effect of physician payments interacted with state type on our outcome measures:

$$\begin{aligned} Outcome_{icst} &= \beta_0 + \beta_1 Fee_{st} + \beta_2 Extended\ Fee\ Boost_s + \beta_3 Fee_{st} * Extended\ Fee\ Boost_s \\ &\quad + \gamma X_i + \delta Z_{ct} + \lambda_s + \lambda_t + \epsilon_{icst} \end{aligned} \tag{A.1}$$

where $Extended\ Fee\ Boost_s$ is an indicator denoting states that extended the fee boost in 2015 (listed in Figure A.2), and all other variables are defined as in Equation (2). Here, the parameters of interest are β_1, the main effect of physician payments, and β_3, the differential effect of physician payments in states where doctors may reasonably have expected the fee boost to be extended. If the fee increase only influences physician behavior in states where doctors predict the fee increase to be permanent, then β_1 would be zero and β_3 would be significant. If, however, doctors are unable to predict the duration of the payment increase, we would expect β_3 to be zero.

Results for this specification are provided in Table A.3.

Table A.3: Effects of Physician Reimbursement by Duration Expectations

Full sample	Medicaid			Private		
	(1) Office Visits	(2) P/F Health	(3) Ex/VG Health	(4) Office Visits	(5) P/F Health	(6) Ex/VG Health
Medicaid fees, in $10	0.0027	-0.0027	0.0059**	-0.0007	0.0002	0.0019
	(0.0017)	(0.0017)	(0.0023)	(0.0010)	(0.0006)	(0.0017)
Extended Payments	-0.0264	-0.0244	-0.0384	-0.0221	0.0272***	-0.0496**
	(0.0183)	(0.0395)	(0.0301)	(0.0073)	(0.0046)	(0.0134)
Fees * Extended	-0.0018	0.0028	0.0007	0.0019**	-0.0002	0.0010
	(0.0020)	(0.0023)	(0.0033)	(0.0008)	(0.0005)	(0.0014)
Observations	96,017	96,067	96,067	337,506	337,903	337,903
R^2	0.071	00.296	0.232	0.036	0.079	0.138
Mean dep. var.	0.196	0.174	0.566	0.174	0.061	0.729

Child Subsample	Medicaid			Private		
	(1) Trouble finding doctor	(2) No usual place of care	(3) 14+ school days missed	(4) Trouble finding doctor	(5) No usual place of care	(6) 14+ school days missed
Medicaid fees, in $10	-0.0055***	-0.0035*	-0.0045**	0.0012*	0.0002	-0.0011
	(0.0015)	(0.0018)	(0.0019)	(0.0007)	(0.0010)	(0.0013)
Extended Payments	0.0344	-0.0193	-0.0053	-0.0252***	0.0667***	0.0093
	(0.0206)	(0.0326)	(0.0438)	(0.0080)	(0.0236)	(0.0394)
Fees * Extended	0.0002	0.0016	-0.0027	-0.0002	-0.0001	-0.0020
	(0.0011)	(0.0017)	(0.0023)	(0.0004)	(0.0012)	(0.0022)
Observations	16,810	21,290	14,630	26,443	34,246	27,909
R^2	0.016	0.022	0.028	0.007	0.029	0.016
Mean dep. var.	0.021	0.031	0.054	0.008	0.021	0.028

Adult Subsample	Medicaid			Private		
	(1) Don't accept new patient	(2) Don't accept insurance	(3) Days missed	(4) Don't accept new patient	(5) Don't accept insurance	(6) Days missed
Medicaid fees, in $10	-0.0080***	-0.0082***	-0.2976	0.0005	-0.0006	0.1275
	(0.0014)	(0.0030)	(0.3658)	(0.0006)	(0.0007)	(0.1129)
Extended Payments	0.0594**	0.0347	9.7533***	0.001	-0.0088	-1.6091*
	(0.0249)	(0.0365)	(3.2685)	(0.0133)	(0.0148)	(0.8514)
Fees * Extended	-0.0021	0.001	-0.7765**	-0.0003	0.0006	0.1857*
	(0.0025)	(0.0038)	(0.2956)	(0.0008)	(0.0008)	(0.0958)
Observations	14,855	14,854	6,321	80,351	80,341	77,548
R^2	0.037	0.040	0.075	0.006	0.009	0.009
Mean dep. var.	0.055	0.075	4.929	0.016	0.022	3.730

Notes: Observations are at the individual level; standard errors are clustered by state. All regressions include state and quarter-year fixed effects, and all individual and county-level controls included in Table 2 (age enters into the regressions as 5-year bins). Regressions are weighted using the sample weights provided in the NHIS.

C Results by Primary Care Shortage Area

Table A.4: Effects of Physician Reimbursement by Primary Care Shortage Area Designation

Full sample	Medicaid			Private		
	(1) Office Visits	(2) P/F Health	(3) Ex/VG Health	(4) Office Visits	(5) P/F Health	(6) Ex/VG Health
Medicaid fees, in $10	0.0025	-0.0028	0.0055**	-0.0006	0.0007	0.0014
	(0.0017)	(0.0017)	(0.0027)	(0.0010)	(0.0006)	(0.0018)
Prim. care shortage	-0.0058	0.015	-0.0248	0.0029	0.0086***	-0.0111*
	(0.0127)	(0.0113)	(0.0183)	(0.0045)	(0.0029)	(0.0063)
Fees * Prim. shortage	0.0008	-0.0007	0.0012	-0.0005	-0.0009**	0.0008
	(0.0017)	(0.0014)	(0.0022)	(0.0006)	(0.0004)	(0.0008)
Observations	96,017	96,067	96,067	337,506	337,903	337,903
R^2	0.071	00.296	0.232	0.036	0.079	0.138
Mean dep. var.	0.196	0.174	0.566	0.174	0.061	0.729

Child Subsample	Medicaid			Private		
	(1) Trouble finding doctor	(2) No usual place of care	(3) 14+ school days missed	(4) Trouble finding doctor	(5) No usual place of care	(6) 14+ school days missed
Medicaid fees, in $10	-0.0058***	-0.0037*	-0.0042	0.0011	0.0003	-0.0010
	(0.0017)	(0.0020)	(0.0022)	(0.0008)	(0.0012)	(0.0013)
Prim. care shortage	-0.0078	-0.0001	-0.0014	0.0012	0.0021	-0.0038
	(0.0140)	(0.0114)	(0.0201)	(0.0052)	(0.0059)	(0.0089)
Fees * Prim. shortage	0.0006	0.0000	0.0000	0.0002	-0.0002	0.0003
	(0.0015)	(0.0012)	(0.0022)	(0.0006)	(0.0007)	(0.0011)
Observations	16,810	21,290	14,630	26,443	34,246	27,909
R^2	0.016	0.022	0.028	0.007	0.029	0.016
Mean dep. var.	0.021	0.031	0.054	0.008	0.021	0.028

Adult Subsample	Medicaid			Private		
	(1) Don't accept new patient	(2) Don't accept insurance	(3) Days missed	(4) Don't accept new patient	(5) Don't accept insurance	(6) Days missed
Medicaid fees, in $10	-0.0081***	-0.0071**	-0.2885	0.0004	-0.0005	0.1703
	(0.0017)	(0.0030)	(0.3118)	(0.0007)	(0.0008)	(0.1248)
Prim. care shortage	-0.0225*	-0.0018	-2.184	-0.0032	0.0046	0.8044
	(0.0129)	(0.0164)	(2.7856)	(0.0052)	(0.0075)	(0.7220)
Fees * Prim. shortage	0.0008	-0.0019	0.2566	0.0003	-0.0003	-0.1255
	(0.0013)	(0.0016)	(0.3115)	(0.0006)	(0.0008)	(0.0844)
Observations	14,855	14,854	6,321	80,351	80,341	77,548
R^2	0.037	0.040	0.075	0.006	0.009	0.009
Mean dep. var.	0.055	0.075	4.929	0.016	0.022	3.730

Notes: Observations are at the individual level; standard errors are clustered by state. All regressions include state and quarter-year fixed effects, and all individual and county-level controls included in Table 2 (age enters into the regressions as 5-year bins). Regressions are weighted using the sample weights provided in the NHIS.

D Robustness to alternative payment variables

Table A.5: Effects of Physician Reimbursement: Imputing with Mean Fee Ratio

Full sample	Medicaid			Private		
	(1) Office Visits	(2) P/F Health	(3) Ex/VG Health	(4) Office Visits	(5) P/F Health	(6) Ex/VG Health
Medicaid fees, in $10	0.0027 (0.0017)	-0.0030* (0.0016)	0.0059** (0.0023)	-0.0008 (0.0010)	0.0002 (0.0006)	0.0017 (0.0017)
Observations	96,017	96,067	96,067	337,506	337,903	337,903
R^2	0.071	0.296	0.232	0.036	0.079	0.138
Mean dep. var.	0.196	0.174	0.566	0.174	0.061	0.729

Child Subsample	Medicaid			Private		
	(1) Trouble finding doctor	(2) No usual place of care	(3) 14+ school days missed	(4) Trouble finding doctor	(5) No usual place of care	(6) 14+ school days missed
Medicaid fees, in $10	-0.0055*** (0.0015)	-0.0037** (0.0018)	-0.0041** (0.0019)	0.0012* (0.0007)	0.0002 (0.0010)	0.0009 (0.0013)
Observations	16,810	21,290	14,630	26,443	34,246	27,909
R^2	0.016	0.022	0.027	0.007	0.029	0.015
Mean dep. var.	0.021	0.031	0.054	0.008	0.021	0.028

Adult Subsample	Medicaid			Private		
	(1) Don't accept new patient	(2) Don't accept insurance	(3) Days missed	(4) Don't accept new patient	(5) Don't accept insurance	(6) Days missed
Medicaid fees, in $10	-0.0076*** (0.0015)	-0.0082*** (0.0030)	-0.1872 (0.3598)	0.0005 (0.0006)	-0.0007 (0.0006)	0.1040 (0.1117)
Observations	14,855	14,854	6,321	80,351	80,341	77,548
R^2	0.037	0.040	0.075	0.006	0.009	0.009
Mean dep. var.	0.055	0.075	4.929	0.016	0.022	3.730

Notes: Observations are at the individual level; standard errors are clustered by state. All regressions include state and quarter-year fixed effects, and all individual and county-level controls included in Table 2 (age enters into the regressions as 5-year bins). Regressions are weighted using the sample weights provided in the NHIS.

Table A.6: Effects of Physician Reimbursement: States in GAO Report

Full sample	Medicaid			Private		
	(1) Office Visits	(2) P/F Health	(3) Ex/VG Health	(4) Office Visits	(5) P/F Health	(6) Ex/VG Health
Medicaid fees, in $10	0.0062** (0.0016)	-0.0021 (0.0024)	0.0078** (0.0037)	-0.0024 (0.0016)	-0.0000 (0.0009)	0.0003 (0.0024)
Observations	61,245	61,282	61,282	193,285	193,545	193,545
R^2	0.070	0.282	0.223	0.036	0.075	0.132
Mean dep. var.	0.192	0.172	0.566	0.173	0.060	0.729

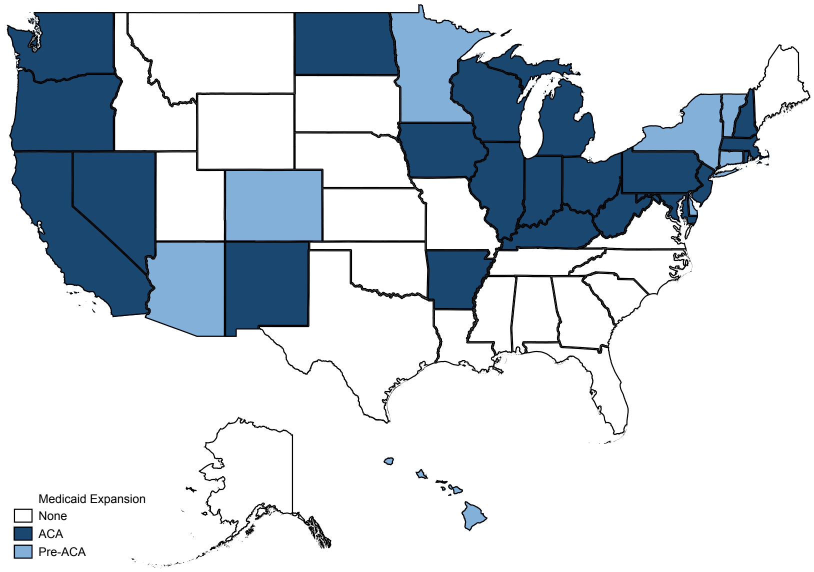
Child Subsample	Medicaid			Private		
	(1) Trouble finding doctor	(2) No usual place of care	(3) 14+ school days missed	(4) Trouble finding doctor	(5) No usual place of care	(6) 14+ school days missed
Medicaid fees, in $10	-0.0043* (0.0024)	-0.0036 (0.0031)	-0.002 (0.002)	0.0009 (0.0013)	0.0008 (0.0022)	-0.0008 (0.0016)
Observations	10,109	13,221	9,224	14,544	19,657	16,164
R^2	0.022	0.021	0.032	0.009	0.029	0.019
Mean dep. var.	0.021	0.031	0.051	0.009	0.022	0.027

Adult Subsample	Medicaid			Private		
	(1) Don't accept new patient	(2) Don't accept insurance	(3) Days missed	(4) Don't accept new patient	(5) Don't accept insurance	(6) Days missed
Medicaid fees, in $10	-0.0080* (0.0039)	0.001 (0.0055)	-0.3079 (0.4778)	0.0005 (0.0011)	0.001 0.0011)	0.0310 (0.1655)
Observations	8,597	8,595	3,839	41,499	41,491	42,137
R^2	0.051	0.046	0.194	0.007	0.010	0.010
Mean dep. var.	0.057	0.070	5.123	0.014	0.021	3.626

Notes: Observations are at the individual level; standard errors are clustered by state. All regressions include state and quarter-year fixed effects, and all individual and county-level controls included in Table 2 (age enters into the regressions as 5-year bins). Regressions are weighted using the sample weights provided in the NHIS.

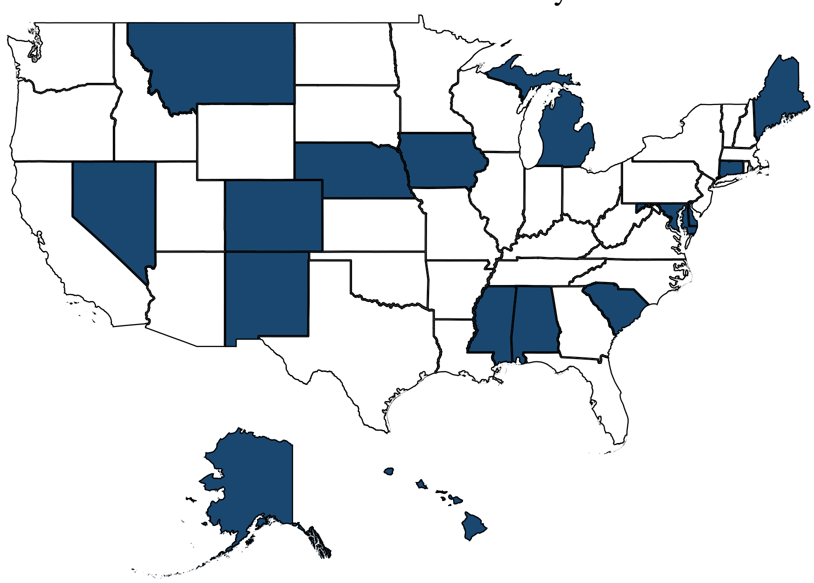
E Supplementary Tables and Figures

Figure A.1: States that Expanded Medicaid



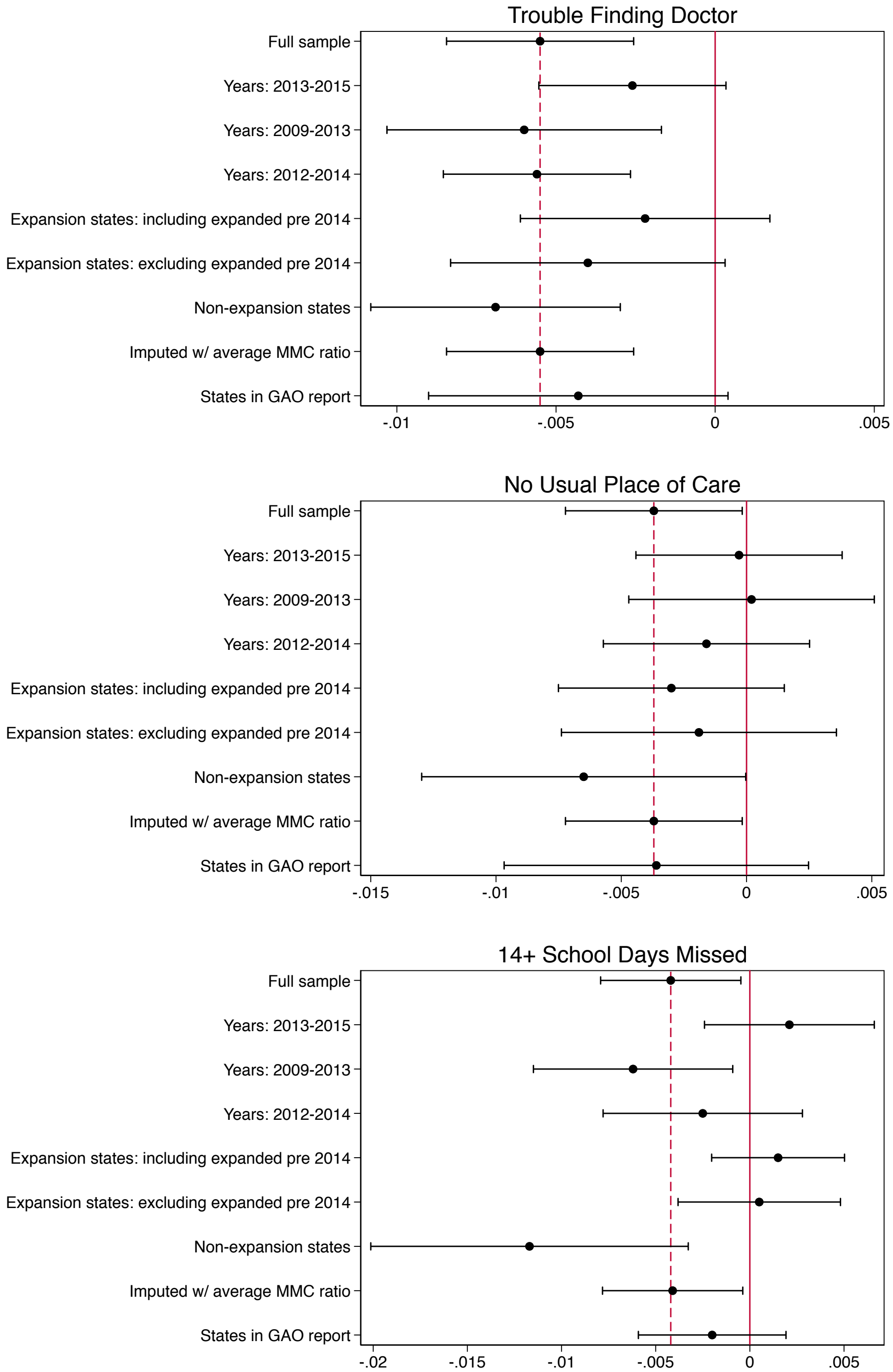
Notes: The above map depicts whether states expanded their Medicaid programs: the dark blue states participated in the ACA Medicaid expansion as of 2014, the light blue states expanded their Medicaid program prior to the ACA, and the remaining states did not particpate in any type of Medicaid expansion by 2014.

Figure A.2: States that Extended the Medicaid Primary Care Rate Increase Past 2014



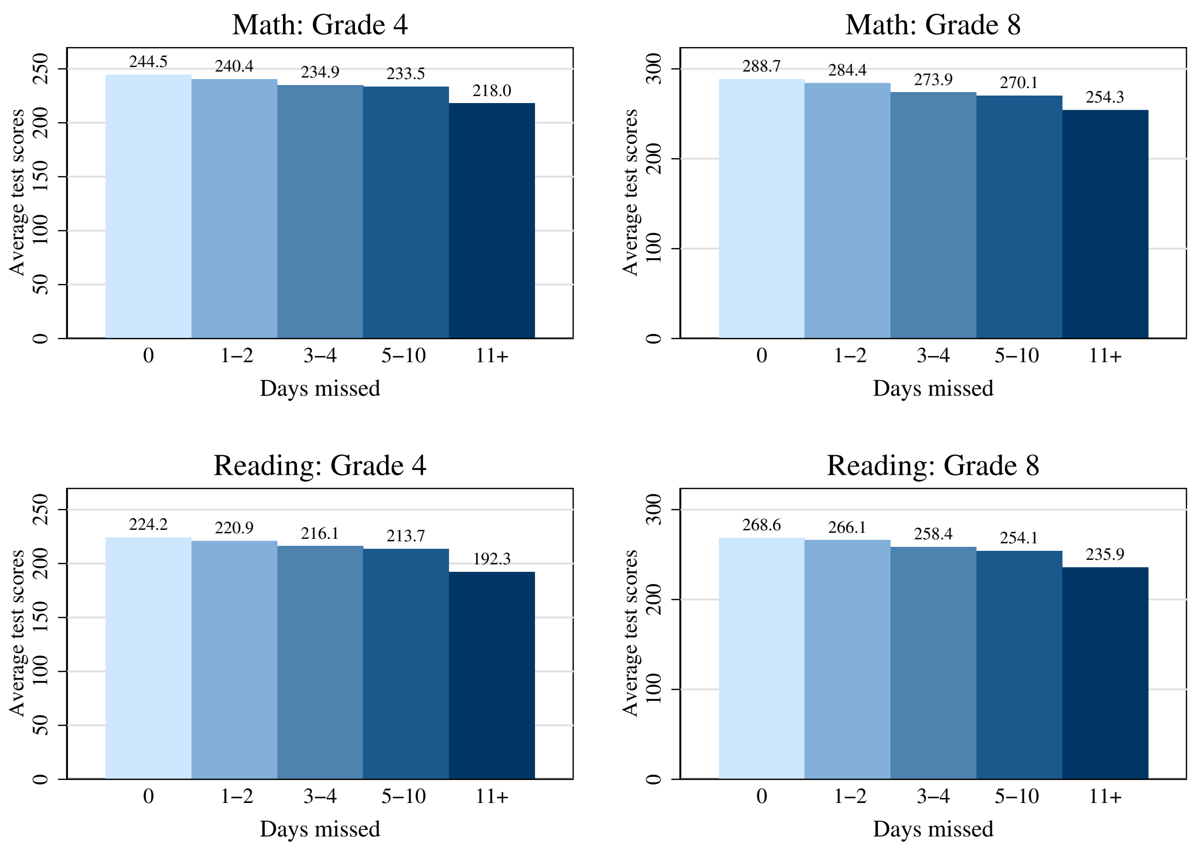
Notes: The above map depicts whether states chose to maintain the primary care rate increase after the federally funded and mandated period ended: shaded states extended higher Medicaid payment rates into 2015.

Figure A.3: Heterogenous Effects of Physician Reimbursement: Child Subsample



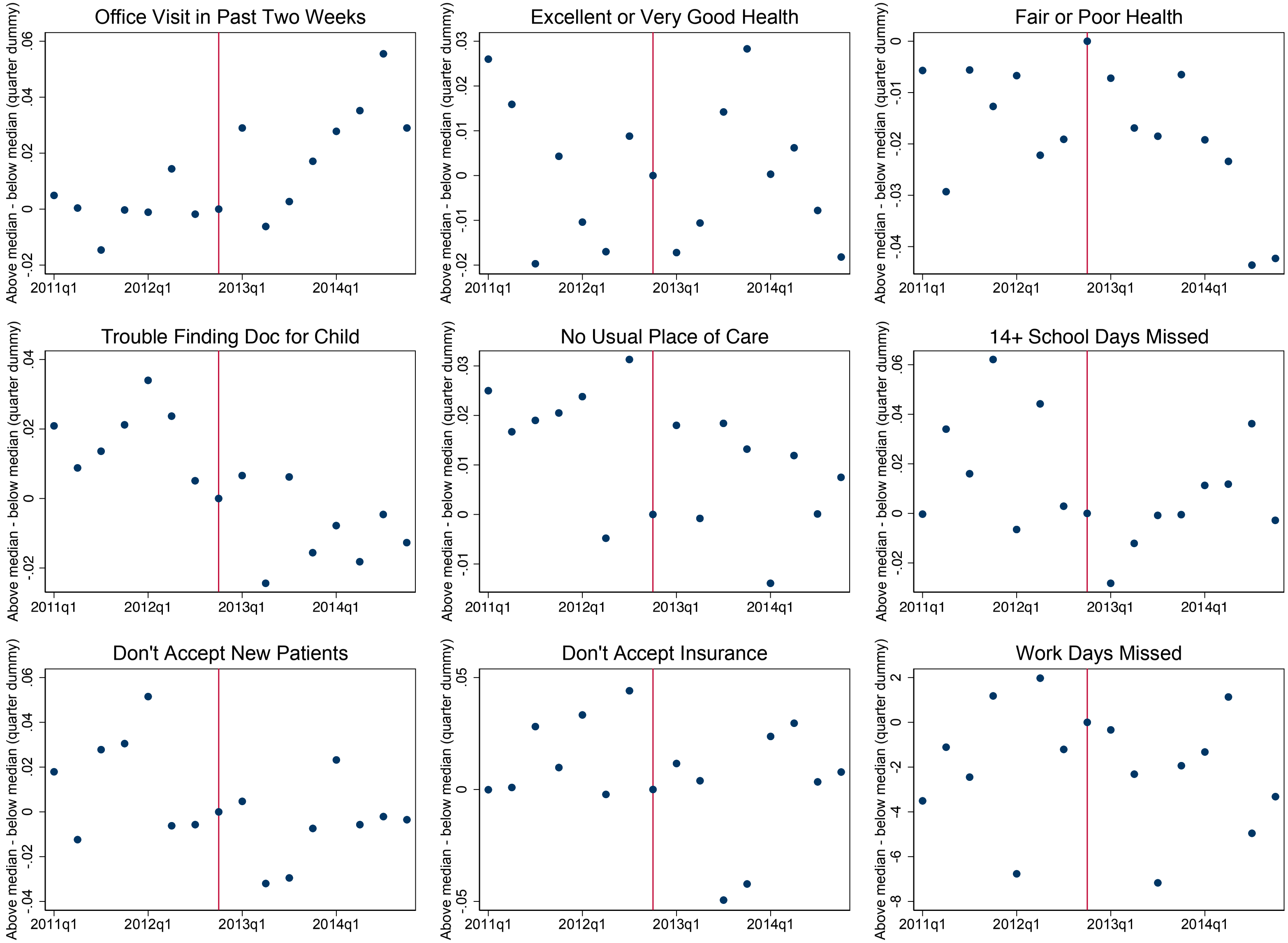
Notes: Each dot in the above figures depicts the estimated effect on a $10 increase in physician reimbursement under Medicaid for the subsample or alternative specification listed on the y-axis. Each coefficient comes from a separate regression. 95% confidence intervals for each coefficient are also reported. The dashed vertical lines show the coefficients in the full sample (as reported in Table 3).

Figure A.4: Average Test Scores by School Absences



Notes: The above figures display the average test scores of students who had missed 0, 1-2, 3-4, 5-10, or 11+ days in the month preceding their state assessment tests from 2009 to 2013. Data comes from the National Assessment of Educational Progress.

Figure A.5: Event Time Figures: by Size of Fee Increase



Notes: the above figures plot the difference between the coefficients on quarter-year dummies ($\lambda_t' s$ in the equation below) for states above and below the median fee increase from 2012-2013. The empirical specification is the same as in equation 1, except without the fee variable: $Outcome_{icst} = \beta_0 + \gamma X_i + \delta Z_{ct} + \lambda_s + \lambda_t + \epsilon_{icst}$, and is run separately on the two groups of states.

Table A.7: Effects of Physician Reimbursement under Medicaid on School Absences

4th Grade Math

	(1) Pct. with 0 days missed	(2) Pct. with 1-2 days missed	(3) Pct. with 3-4 days missed	(4) Pct. with 5-10 days missed	(5) Pct. with 11+ days missed
Medicaid fees, in $10	0.425***	-0.085	-0.155**	-0.102*	-0.002
	(0.152)	(0.121)	(0.064)	(0.058)	(0.035)
Observations	150	150	150	150	150
R^2	0.892	0.721	0.844	0.650	0.783
Mean dep. var.	49.067	30.773	12.400	5.107	2.640

4th Grade Reading

	(1) Pct. with 0 days missed	(2) Pct. with 1-2 days missed	(3) Pct. with 3-4 days missed	(4) Pct. with 5-10 days missed	(5) Pct. with 11+ days missed
Medicaid fees, in $10	0.305**	-0.051	-0.162**	-0.043	-0.021
	(0.125)	(0.106)	(0.076)	(0.064)	(0.037)
Observations	150	150	150	150	150
R^2	0.886	0.772	0.788	0.725	0.747
Mean dep. var.	49.247	30.833	12.313	5.080	2.600

8th Grade Math

	(1) Pct. with 0 days missed	(2) Pct. with 1-2 days missed	(3) Pct. with 3-4 days missed	(4) Pct. with 5-10 days missed	(5) Pct. with 11+ days missed
Medicaid fees, in $10	0.251	-0.072	-0.083	-0.037	-0.050
	(0.161)	(0.116)	(0.087)	(0.060)	(0.039)
Observations	150	150	150	150	150
R^2	0.875	0.803	0.839	0.758	0.766
Mean dep. var.	42.787	36.320	13.753	5.173	1.953

8th Grade Reading

	(1) Pct. with 0 days missed	(2) Pct. with 1-2 days missed	(3) Pct. with 3-4 days missed	(4) Pct. with 5-10 days missed	(5) Pct. with 11+ days missed
Medicaid fees, in $10	0.259*	0.101	-0.265**	-0.066	-0.043
	(0.142)	(0.102)	(0.104)	(0.067)	(0.048)
Observations	150	150	150	150	150
R^2	0.888	0.853	0.803	0.721	0.743
Mean dep. var.	42.927	36.647	13.513	5.080	1.787

Notes: Observations are at the state-year level; standard errors clustered by state. All regressions include state and year fixed effects. Data is from 2009, 2011, and 2013.

Table A.8: Effects of Physician Medicaid Reimbursement Absences: Free Lunch

4th Grade Math

	(1) Pct. with 0 days missed	(2) Pct. with 1-2 days missed	(3) Pct. with 3-4 days missed	(4) Pct. with 5-10 days missed	(5) Pct. with 11+ days missed
Medicaid fees, in $10	0.462***	0.013	-0.276**	-0.217**	-0.000
	(0.142)	(0.139)	(0.124)	(0.082)	(0.077)
Observations	150	150	150	150	150
R^2	0.867	0.600	0.720	0.593	0.665
Mean dep. var.	44.000	31.353	14.653	6.107	3.867

4th Grade Reading

	(1) Pct. with 0 days missed	(2) Pct. with 1-2 days missed	(3) Pct. with 3-4 days missed	(4) Pct. with 5-10 days missed	(5) Pct. with 11+ days missed
Medicaid fees, in $10	0.429***	0.028	-0.299***	-0.101	-0.048
	(0.148)	(0.137)	(0.102)	(0.078)	(0.046)
Observations	150	150	150	150	150
R^2	0.866	0.718	0.704	0.713	0.703
Mean dep. var.	44.207	31.473	14.593	6.007	3.787

8th Grade Math

	(1) Pct. with 0 days missed	(2) Pct. with 1-2 days missed	(3) Pct. with 3-4 days missed	(4) Pct. with 5-10 days missed	(5) Pct. with 11+ days missed
Medicaid fees, in $10	0.484**	-0.202	-0.010	-0.094	-0.104
	(0.195)	(0.151)	(0.150)	(0.113)	(0.063)
Observations	150	150	150	150	150
R^2	0.866	0.665	0.738	0.662	0.732
Mean dep. var.	37.760	35.647	16.700	6.933	3.027

8th Grade Reading

	(1) Pct. with 0 days missed	(2) Pct. with 1-2 days missed	(3) Pct. with 3-4 days missed	(4) Pct. with 5-10 days missed	(5) Pct. with 11+ days missed
Medicaid fees, in $10	0.343	0.191	-0.297*	-0.164*	0.013
	(0.265)	(0.257)	(0.160)	(0.084)	(0.069)
Observations	150	150	150	150	150
R^2	0.856	0.647	0.732	0.673	0.724
Mean dep. var.	37.880	35.947	16.620	6.787	2.847

Notes: Observations are at the state-year level; standard errors clustered by state. All regressions include state and year fixed effects. Data is from 2009, 2011, and 2013.

Table A.9: Effects of Physician Medicaid Reimbursement Absences: Not Eligible for Free Lunch

4th Grade Math

	(1) Pct. with 0 days missed	(2) Pct. with 1-2 days missed	(3) Pct. with 3-4 days missed	(4) Pct. with 5-10 days missed	(5) Pct. with 11+ days missed
Medicaid fees, in $10	0.431*	-0.262*	-0.164*	-0.001	-0.033
	(0.229)	(0.148)	(0.098)	(0.062)	(0.055)
Observations	150	150	150	150	150
R^2	0.772	0.665	0.703	0.598	0.470
Mean dep. var.	52.967	30.300	10.620	4.367	1.727

4th Grade Reading

	(1) Pct. with 0 days missed	(2) Pct. with 1-2 days missed	(3) Pct. with 3-4 days missed	(4) Pct. with 5-10 days missed	(5) Pct. with 11+ days missed
Medicaid fees, in $10	0.286	-0.143	-0.069	-0.015	-0.030
	(0.193)	(0.145)	(0.084)	(0.071)	(0.042)
Observations	150	150	150	150	150
R^2	0.784	0.710	0.695	0.581	0.583
Mean dep. var.	53.133	30.353	10.607	4.327	1.540

8th Grade Math

	(1) Pct. with 0 days missed	(2) Pct. with 1-2 days missed	(3) Pct. with 3-4 days missed	(4) Pct. with 5-10 days missed	(5) Pct. with 11+ days missed
Medicaid fees, in $10	0.200	0.006	-0.158	-0.074	-0.030
	(0.207)	(0.143)	(0.104)	(0.074)	(0.034)
Observations	150	150	150	150	143
R^2	0.835	0.777	0.785	0.662	0.676
Mean dep. var.	45.887	36.913	11.900	4.013	1.371

8th Grade Reading

	(1) Pct. with 0 days missed	(2) Pct. with 1-2 days missed	(3) Pct. with 3-4 days missed	(4) Pct. with 5-10 days missed	(5) Pct. with 11+ days missed
Medicaid fees, in $10	0.268	-0.094	-0.208*	0.073	0.014
	(0.184)	(0.122)	(0.113)	(0.068)	(0.043)
Observations	150	150	150	150	145
R^2	0.861	0.799	0.751	0.643	0.585
Mean dep. var.	46.027	37.153	11.593	3.980	1.255

Notes: Observations are at the state-year level; standard errors clustered by state. All regressions include state and year fixed effects. Data is available from 2009, 2011, and 2013.

Table A.10: Effects of Physician Reimbursement under Medicaid on Test Scores

4th Grade Math

	(1) Test scores 0 days missed	(2) Test scores 1-2 days missed	(3) Test scores 3-4 days missed	(4) Test scores 5-10 days missed	(5) Test scores 11+ days missed
Medicaid fees, in $10	-0.128	-0.261	-0.233	0.163	0.468
	(0.138)	(0.172)	(0.175)	(0.274)	(0.443)
Observations	150	150	150	150	133
R^2	0.950	0.948	0.903	0.888	0.783
Mean dep. var.	244.547	240.395	234.898	233.547	218.007

4th Grade Reading

	(1) Test scores 0 days missed	(2) Test scores 1-2 days missed	(3) Test scores 3-4 days missed	(4) Test scores 5-10 days missed	(5) Test scores 11+ days missed
Medicaid fees, in $10	0.002	0.057	0.062	-0.480	0.152
	(0.129)	(0.145)	(0.277)	(0.453)	(0.795)
Observations	150	150	150	150	131
R^2	0.962	0.949	0.902	0.865	0.723
Mean dep. var.	224.185	220.928	216.108	213.696	192.338

8th Grade Math

	(1) Test scores 0 days missed	(2) Test scores 1-2 days missed	(3) Test scores 3-4 days missed	(4) Test scores 5-10 days missed	(5) Test scores 11+ days missed
Medicaid fees, in $10	0.411**	0.298*	0.477**	-0.036	-0.610
	(0.176)	(0.164)	(0.224)	(0.310)	(1.334)
Observations	150	150	150	150	64
R^2	0.968	0.966	0.939	0.862	0.790
Mean dep. var.	288.665	284.352	273.929	270.138	254.282

8th Grade Reading

	(1) Test scores 0 days missed	(2) Test scores 1-2 days missed	(3) Test scores 3-4 days missed	(4) Test scores 5-10 days missed	(5) Test scores 11+ days missed
Medicaid fees, in $10	0.195	-0.047	0.182	-0.363	1.478
	(0.168)	(0.134)	(0.226)	(0.456)	(0.890)
Observations	150	150	150	150	55
R^2	0.959	0.961	0.917	0.811	0.751
Mean dep. var.	268.644	266.059	258.375	254.061	235.907

Notes: Observations are at the state-year level; standard errors clustered by state. All regressions include state and year fixed effects. Data is from 2009, 2011, and 2013.

Table A.11: Effects of Physician Reimbursement: Difference-in-Difference Specification

Person sample	Medicaid + Private		
	(1) Office Visits	(2) P/F Health	(3) E/VG Health
Medicaid fees, in $10	0.0001	0.0007	0.0019
	(0.0009)	(0.0006)	(0.0015)
Medicaid	0.0800***	0.0793***	-0.0878***
	(0.0097)	(0.0065)	(0.0113)
Medicaid fees * Medicaid	-0.001	-0.0027***	0.0035***
	(0.0008)	(0.0006)	(0.0012)
Observations	596,508	597,078	597,078
R^2	0.046	0.129	0.172
Mean dep. var.	0.168	0.101	0.66

Child Subsample	Medicaid + Private		
	(1) Trouble Finding Doc	(2) No Usual Care	(3) 14+ School Days Missed
Medicaid fees, in $10	-0.0006	-0.0010	-0.0009
	(0.0006)	(0.0010)	(0.0006)
Medicaid	0.0102*	-0.0496***	0.0325***
	(0.0054)	(0.0084)	(0.0078)
Medicaid fees * Medicaid	-0.0012**	-0.0001	-0.0021**
	(0.0006)	(0.0007)	(0.0008)
Observations	52,061	67,474	52,493
R^2	0.008	0.061	0.017
Mean dep. var.	0.015	0.043	0.035

Adult Subsample	Medicaid + Private		
	(1) Don't accept new patient	(2) Don't accept insurance	(3) Days missed
Medicaid fees, in $10	0.0007	-0.0005	-0.0451
	(0.0007)	(0.0007)	(0.0703)
Medicaid	0.0497***	0.0761***	1.8789*
	(0.0119)	(0.0112)	(0.9693)
Medicaid fees * Medicaid,	-0.0037***	-0.0046***	-0.1021
	(0.0011)	(0.0011)	(0.1021)
Observations	137,174	137,125	112,835
R^2	0.015	0.016	0.008
Mean dep. var.	0.024	0.030	3.710

Notes: Observations are at the individual level; standard errors are clustered by state. All regressions include state and quarter-year fixed effects, and all individual and county-level controls included in Table 2 (age enters into the regressions as 5-year bins). Regressions are weighted using the sample weights provided in the NHIS.