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## Working Paper Closing the gap: The impact of the medicaid primary care rate increase on access and health

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# Federal Reserve Bank of Chicago

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

Diane Alexander and Molly Schnell

# May 3, 2017

## WP 2017-10

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# 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 doctor payment rates on access and health outcomes for beneficiaries. In this paper, we exploit within-state 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. As Medicaid rates are set by states and vary considerably in generosity, the policy had a large and heterogeneous impact across states. We find that increasing Medicaid payments to primary care doctors is associated with significant increases in doctors' visits, improvements in access measures, better self-reported health, and fewer school days missed among Medicaid beneficiaries.

JEL: I11, I18, H51, H75 Keywords: Medicaid, primary care, access, physician reimbursement

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## **1** Introduction

Medicaid beneficiaries often have a harder time finding available health care providers than patients with other types of health insurance. Many doctors either do not accept Medicaid or are not currently accepting new Medicaid patients, with some physicians arguing that payments are so low that they lose money when treating Medicaid beneficiaries. Recent evidence suggests that disparities in reimbursement generosity lead to privately insured patients being preferred over the publicly insured in hospitals, resulting in significant differences in treatment for the same conditions (Alexander and Currie, Forthcoming). However, whether increasing Medicaid payments to primary care physicians will improve access and health among beneficiaries remains an open question.

In this paper, we exploit within-state variation in the generosity of Medicaid reimbursement rates to examine whether increasing Medicaid payments to primary care doctors is associated with better access to treatment and improved health outcomes. To do so, we combine a new database of state-level Medicaid reimbursement rates for primary care services from 2009-2015 with measures of access to care and health status from the National Health Interview Survey (NHIS). Most of our variation in physician payments comes from the Medicaid primary care rate increase of 2013 and 2014, which varied substantially across states in both magnitude and duration.<sup>1</sup> Designated in Section 1202 of the Affordable Care Act (ACA), this fee increase required states to increase Medicaid payments for primary care services to Medicare levels for 2013 and 2014. Primary care services are defined as evaluation and management services and vaccine administration provided by physicians in family medicine, general internal medicine, and pediatric medicine.

Before the Medicaid primary care rate increase, Medicaid paid doctors just 66 percent of Medicare payments for the same services on average across states (Zuckerman and Goin, 2012). This low payment level was reflected in provider participation—only 65 percent of office-based physicians were accepting new Medicaid patients in 2009, compared to 88 percent who were accepting

<sup>&</sup>lt;sup>1</sup>Some states, such as Alaska, already had very generous Medicaid payments relative to Medicare, and thus the policy had no effect. In other states, however, the fee bump more than doubled the reimbursement rate for primary care services.

new privately insured patients (Medicaid and CHIP Payment and Access Commission, 2011). The Medicaid primary care fee increase 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). However, reasons other than payment levels have been cited for low physician participation in Medicaid, including payment delays, complex program requirements, and concerns about managing the care of difficult patients, making the effect of increasing payments on access uncertain (Rosenbaum, 2014).

We find that an increase in the reimbursement rate for new Medicaid patients is associated with increases in the number of office visits, improvements in self-reported health, and decreases in reports that doctors are either not taking new Medicaid patients or not accepting Medicaid among the program's beneficiaries. Furthermore, we find reductions in days of schools missed among children covered by Medicaid. We find no evidence that the benefits of increasing Medicaid payment rates are offset by negative spillovers for the privately insured.

As many states expanded their Medicaid programs at a similar time as the primary care rate increase, it is important for the interpretation of our results that our effects are driven by the generosity of physician reimbursement rather expanded access to insurance. We are able to separately identify the impact of the changing primary care payments from the effects of expanding Medicaid in three ways. First, as many states opted out of the ACA Medicaid expansions, we can compare the effects of the rate increase in states that did and did not expand Medicaid. Second, we use pre-ACA variation in Medicaid payments to show that the relationship between payments and access is stable from 2009-2014, and is not driven only by the ACA rate increase. Finally, we break Medicaid beneficiaries into subgroups which were differentially affected by the 2014 Medicaid expansion: children and adults with children were less affected, and childless adults saw large increases in eligibility.

While there is a large empirical literature studying the effect of Medicaid coverage on the use of medical services and health outcomes (Alexander and Currie, Forthcoming; Baicker et al., 2013; Buchmueller et al., 2014; Currie and Gruber, 1996a,b; Finkelstein et al., 2012), there is less

work examining how physician reimbursement under Medicaid influences a doctor's decision to accept Medicaid patients. The existing empirical literature on the impacts of Medicaid payment rates on access to treatment is inconclusive. While Long et al. (1986) find that low physician reimbursement levels do not impede access to ambulatory care, Currie et al. (1995) and Cohen and Cunningham (1995) find that more generous Medicaid reimbursement rates are associated with better infant health and a greater likelihood of children having a doctor's office as a usual source of care, respectively. Cohen and Cunningham (1995) also provide suggestive evidence that higher Medicaid fees lead primary care doctors to accept more Medicaid patients. However, as they only have data for 1987, this evidence relies on cross-sectional variation. Furthermore, as there have been important structural changes to Medicaid over the past two decades, this older literature may also not be directly applicable to the present day.

Recent work studying the impact of the generosity of Medicaid reimbursement on access has been hampered by two important data limitations. First, most states have not made large changes to their Medicaid reimbursement rates for primary care in the last decade. Second, the rise of Medicaid Managed Care has made it difficult to know how much doctors are actually being paid. Under fee-for-service, states set reimbursement rates for each service, and Medicaid pays doctors the corresponding amount for each service provided to a Medicaid beneficiary. Fee-for-service Medicaid was the status quo until XX, and these reimbursement rates are at least theoretically available by contacting each state. Under managed care, which became popular in the XX, states typically contract with managed care organizations (MCO) to provide some or all Medicaid-covered services to beneficiaries. The state pays the MCO a fixed amount per beneficiary each month to provide all covered services and the MCO pays providers for the services. Despite the fact that 60 percent of Medicaid beneficiaries were enrolled in comprehensive managed care in 2014, little is known about how or how much MCOs pay their doctors.

Importantly, state Medicaid payments were required to achieve parity with Medicare for both their fee-for-service and managed care programs in 2013 and 2014. This fee increase is unique, as it allows us examine the effects of increased physician payment on the entire Medicaid sys-

tem, rather than just the rapidly shrinking fee-for-service portion. We thus address both problems simultaneously by exploiting a federally mandated change to both Medicaid fee-for-service and managed care reimbursement rates for primary care doctors that varied substantially in magnitude across states. In 2013 and 2014, we know exactly how much doctors were reimbursed for both fee-for-service and managed care Medicaid patients. For the pre-period we use data from the Gov-ernment Accountability Office documenting state-level reimbursement ratios in 2010 for Medicaid managed care relative to fee-for-service patients, and CMS data on the fraction enrolled in each system, to estimate payments from Medicaid Managed Care (Yocom, 2014).

Early work on the effects of the primary care fee increase has been inconclusive. In an audit study, Polsky et al. (2015) find evidence that the payment increase was associated with a large increase in appointment availability for Medicaid patients, which tended to be largest in states with the largest payment increases. Ongoing work has tied the fee increase to increased provider payment, and increased rates of breast and cervical cancer screening (Kirby, 2016; Sabik, 2016). However, others have found small to no effects of the payment increase on physician participation in Medicaid (Decker, 2016; Mulcahy et al., 2016). Due to lags in data availability, these early studies tend to use small samples, only look at certain portions of the Medicaid population, and use data from a short time period or only a few states. In addition, many studies compare outcomes before and after the policy without exploiting variation in the magnitude of the fee boost across states. In contrast, we use a large panel in every state that includes payment variation before the primary care fee increase and exploit variation in both fee-for-service and managed care payment rates.

The rest of the paper proceeds as follows. We provide an overview of our data and research methods in Sections 2 and 3, respectively. Results are presented in Section 4. Section 5 provides a discussion and concludes.

## 2 Data

We use three main sources to document how changing reimbursement rates affect access to health care services and population health. Our main explanatory variable comes from a newly constructed dataset containing Medicaid fees for evaluation and management services for all states from 2009-2015. Our main outcome variables come from the National Health Interview Survey (NHIS). The NHIS is a large interview survey conducted each year to track the levels, distributions, and effects of illnesses and disabilities in the US. Finally, we use data on test scores and school absences from the National Center for Education Statistics to corroborate the NHIS outcomes related to schooling.

#### 2.1 Medicaid Reimbursement Rates

Our primary explanatory variable is the amount Medicaid pays doctors for new patient evaluation and management services, using data on fee-for-service payment rates obtained from state Medicaid offices. In the fee-for-service payment system, there are five Medicaid reimbursement rates for new patient evaluation and management services, each corresponding to a specific length and complexity of the visit. We obtained historical payment data for these five codes by contacting the Medicaid offices of all 50 states and Washington, D.C.<sup>2</sup> Our main results use reimbursement rates associated with a visit lasting approximately 30 minutes with a patient of intermediate complexity (CPT 99203)—conversations with doctors suggest that this is the expected duration of a new patient visit.<sup>3</sup>

The amount doctors are paid under fee-for-service Medicaid does not tell the whole story, however, as the fraction of beneficiaries enrolled in Medicaid managed care plans has steadily increased over time. We take Medicaid managed care into account by creating a Medicaid payment measure that combines the fee-for-service data with data on managed care payment levels and

<sup>&</sup>lt;sup>2</sup>Our payment data series is nearly complete, with the exception of Tennessee and South Dakota, which required imputation—see Appendix A.1 for more details.

<sup>&</sup>lt;sup>3</sup>Our results are robust to using a average of the five fees, weighted by the fraction of patients billing in each category in Medicare in 2012 (unfortunately, we do not have access to billing frequencies from Medicaid).

enrollment, which vary substantially across states and over time (see Figure 3). While the ACA fee boost was applied to both the fee-for-service and managed care branches of Medicaid, the rates paid to primary care doctors under managed care from 2009 to 2012 are not necessarily the same as those paid under fee-for-service. According to data from the Government Accountability Office (GAO) on the ratio of Medicaid managed care to fee-for-service payments for evaluation and management services in an office setting for 20 states in 2009, the median difference between payments is five percent—though a few states report much larger discrepancies (Yocom, 2014).

We use the GAO data to account for level differences between fee-for-service and managed care payments before 2013. 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. We then define the overall expected payment from Medicaid as the weighted average of the fee-for-service expected payment and the managed care expected payment, where the weights are given by the fraction of Medicaid enrollees in each type of plan in each state and year. As the GAO data only gives a feefor-service to managed care ratio for 20 states, we use the reported ratio for the states in the GAO report and the median ratio for the missing states. To the extent that there is noise in our payment data from using an imperfect measure of expected payments, our results will underestimate the average effect of expected payments on health care access.

Both the initial geographical variation in Medicaid payment rates and the changes over our sample period are substantial. Figure 1 shows the variation in 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 2009, the expected Medicaid payment for treating a new patient (CPT 99203) varied from approximately \$30 to \$190. The range tightened considerably in 2013, with the least generous state paying \$119 and the most generous state paying doctors just over \$200. After the fee boost in 2013, all states' fees were within the range of the top quintile of states in 2009, and the state at the 50th (75th) percentile experienced a pay increase of 51 (103) percent when the fee bump went into effect. While there were some changes in Medicaid payment rates prior to 2013 (see Figure 2), most of our variation comes from the primary care rate increase mandated by the ACA.

Figure 2 also shows that many states returned to their previous payment levels when the primary care rate increase mandated in the ACA expired in 2015. While this provides another large change in state-level payment rates, states may have made this decision based upon their experience during the primary care rates increase. In our main analysis, therefore, we do not use the variation in payments coming from the fee boost turning off in 2015. Instead, we will examine the effects of this reverse experiment on health and outcome measures separately from the pre-2015 payment variation.

Of course, the changes in Medicaid payments stemming from the primary care fee boost did not occur in isolation. Many pieces of US health care were undergoing major changes related to the ACA. In particular, during the same time period states were deciding whether or not to participate in Medicaid expansions. Following the 2012 decision by the Supreme Court, 27 states and the District of Columbia decided to expand their Medicaid programs in 2014 to include coverage for low-income adults without children (see Figure A.1). These state-level decisions to expand Medicaid may have been correlated with both population access to health care services and underlying population health. In our main analysis, we control for whether states expanded Medicaid in 2014. We also break our sample by whether states expanded Medicaid, and by family structure, to examine whether changes in the composition of those covered by Medicaid are related to the effect of changes in payments on access and health measures.

#### 2.2 National Health Interview Survey

Our outcome variables drawn from the NHIS can be divided into two broad categories: (1) access to and use of health care services and (2) health outcomes. To measure access to and use of health care services, we consider whether an office visit was made in the past two weeks, indicators for whether respondents reported difficulty with doctors either not accepting new patients or not accepting their insurance, and an indicator for whether parents had difficulty finding a doctor to see their child, or whether their child has a usual place of care. The exact survey questions used are outlined in Appendix A.2. All questions are asked over our full sample period except those

asking whether adults and children had trouble finding a doctor, which started in 2011. As can be 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 accept them as a patient or to be told that a doctor will not accept their insurance.

To measure health outcomes, we consider indicators denoting whether people rate their health as excellent/very good or fair/poor, as well as the number of work and school days respondents report having missed in the past year. As can be seen in Table 1, survey respondents covered by Medicaid are almost three times more likely to be in fair or poor health than the privately insured, and are less likely to report being in very good or excellent health. In addition, Medicaid beneficiaries miss more days of work and school per year than the privately insured. Assuming a 180 day school year, Table 1 suggests that children on Medicaid have a relatively high absentee rate of 6.6 percent. Privately insured children, on the other hand, report an absentee rate of 4.1 percent, which is more in line with the findings of other papers studying school attendance (Currie et al., 2009; Fowler et al., 1992). School absences have been shown to limit human capital attainment: children who miss more school receive lower grades and are more likely to drop out (Currie et al., 2009; Grossman and Kaestner, 1997). Furthermore, most school absences are attributable to either respiratory infections or gastroenteritis—illnesses mostly treated in a primary care setting, and thus potentially responsive to increased access to primary care (Gilliland et al., 2001).

Our main sample is the population covered by Medicaid, the population for which changes in Medicaid payments to doctors are directly relevant. We also look at the privately insured population for comparison, both as a placebo group and to examine whether changes in Medicaid reimbursement rates spill over into the care of 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 Health Resources and Services Administration's Area Resource Files. Table 2 reports summary statistics for our main explanatory variables, as well as individual and county-level controls by patient insurance type. Relative to the privately insured, people covered by Medicaid 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 more densely populated, poorer 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 identifiers. All of our analyses are therefore conducted in a Census Research Data Center.

#### 2.3 National Assessment of Educational Progress

Childhood health investments can impact educational attainment, which in turn affects productivity in adulthood. Therefore, an important question is whether improving access to health care is associated with better educational outcomes for low-income children. The NHIS asks about school attendance, but only in the child subsample which has a fairly small sample size. We supplement this information with the National Assessment of Educational Progress (NAEP) from the National Center for Education Statistics, who administer reading and mathematics assessments for grades 4 and 8 every other year in all states. 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 research question, the NAEP reports state-level test scores by the number of days absent in the past month: 0 days, 1-2 days, 3-4 days, 5-10 days, and 11 or more. In addition, the NAEP reports both average test scores and the fraction of children in each of these bins. Thus, we can look both at test scores and at the overall distribution of reported school absences. All state assessments take place from January through March, so we attach average Medicaid payment rates over the first quarter to each calender year of test scores.

We focus on the math and reading assessments, which are available at the state level for grades 4 and 8 in 2009, 2011, and 2013. Figure 4 shows the distribution of absences reported on math and reading test scores in grade 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. There are large differences by grade, however, with a much larger fraction of students reporting zero absences in the past month in 4th grade compared to 8th grade. Our test score measures are the math and reading composite scales, each of which are reported by grade and the number of absences in the past month. In all grades and subjects, average test scores are monotonically decreasing in the number of school days missed in the past month (Figure A.3).

## **3** Empirical Strategy

We have seen that those covered by Medicaid tend to have worse health access and outcomes than the privately insured. In order to investigate the relationship between these variables and physician payment levels, we estimate the effect of changes in payment on both health care utilization and health outcomes:

$$Outcome_{icst} = \beta_0 + \beta_1 Fee_{st} + \gamma X_i + \delta Z_{ct} + \lambda_s + \lambda_t + \epsilon_{icst}$$
(1)

where  $Outcome_{icst}$  denotes a utilization or health outcome for individual *i* living in county *c* in state *s* in time *t*;  $Fee_{st}$  is the relevant Medicaid fee in state *s* in time *t*;  $X_i$  and  $Z_{ct}$  are vectors of individual and county characteristics, respectively (listed in Table 2); and  $\lambda_s$  and  $\lambda_t$  are state and time fixed effects. Since we include state and time fixed effects, the identification for our main coefficient of interest,  $\beta_1$ , 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 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:

$$Outcome_{st} = \beta_0 + \beta_1 Fee_{st} + \lambda_s + \lambda_t + \epsilon_{st}$$
<sup>(2)</sup>

where  $Fee_{st}$  is the expected Medicaid reimbursement in the first quarter of year t (the tests are taken between January and March) and  $\lambda_s$  and  $\lambda_t$  are state and year fixed effects, respectively. The outcomes are the percent of children with 0, 1-2, 3-4, 5-10, and 11 or more absences as well as the average test scores within each absence bin. Standard errors are again clustered at the state level.

Finally, we are interested in whether the effect of the ACA primary care pay increase on health outcomes was different in states that did and did not expand Medicaid, as well as whether the effect of the pay increase is unique relative to pay increases that occurred in previous years. Thus, we estimate Equation (1) separately in each of the following subsamples: (1) families with and without children, (2) states that did and did not expanded Medicaid in 2014, and (3) three time periods (2009-2011, 2012-2014, and 2013-2015).

## **4 Results**

The three panels of Table 3 show the impact of changes in Medicaid reimbursement levels on the full NHIS sample, the adult subsample, and the child subsample, respectively. The first three columns of each panel show the effects of Medicaid fee increases on respondents covered by Medicaid, while the last three columns show the effect of Medicaid pay on respondents with private insurance.

Looking first to the results for Medicaid beneficiaries in the full NHIS sample, we see that increases in Medicaid reimbursement rates for primary care doctors are associated both with increases in the likelihood of having an office visit in the past two weeks and with improvements in self-reported health. As shown in the top panel of Table 3, a \$10 increase in doctor payments is associated with a statistically significant 0.29 percentage point increase in the probability that a

respondent went to a doctor's office in the past two weeks (an increase of 1.5 percent relative to the mean). The same increase in payments is further associated with a 1.2 percent decrease in the probability of reporting fair or poor health and a 0.8 percent increase in the probability of reporting very good or excellent health.

To get a sense of what these magnitudes imply for the primary care rate increase, we consider the implied changes in these outcome measures associated with an increase in payments of \$40, the average increase in payments from the third quarter of 2012 to the first quarter of 2013. Multiplying the results by four, we see that an increase of \$40 in the primary care payment to doctors is associated with a 6 percent increase in the probability of visiting a doctor's office in the past two weeks, a 4.8 percent decrease in the probability of being in fair or poor health, and an increase of 3.2 percent in the probability of being in very good or excellent health.

Among adults covered by Medicaid, higher Medicaid reimbursement rates are associated with large decreases in the likelihood that beneficiaries are told that doctors are either not accepting new patients or do not accept their insurance. As shown in the second panel of Table 3, a \$10 increase in payments is associated with both a 12 percent reduction in the probability of being turned away as a new patient (column 1) and a 10 percent reduction in the probability of being told that one's insurance is not accepted (column 2) among Medicaid beneficiaries. We further see that parents of children covered by Medicaid 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 19 and 11 percent decrease relative to the mean, respectively (panel 3, columns 1 and 2).

Finally, there is some evidence that this improvement in access translates to improved school attendance for children. Column 3 of the bottom panel of Table 3 shows that a \$10 increase in physician reimbursement is associated with a marginally statistically significant decrease of 1.8 missed days of school for children. Assuming a school year of 180 days, this reduction in days missed reduces the proportion of days absent from 6.6 to 5.6 percent for children on Medicaid. While the standard error is fairly large, the estimated effect of an increase of primary care doctor

payments by \$10 on the absence rate is similar to the effect of substantial reductions in air pollution found in Currie et al. (2009). However, there is no corresponding decrease in the number of days missed of work for adults.

While Table 3 provides strong evidence that increased Medicaid payment to doctors is associated with improved access and health among Medicaid beneficiaries, there is no evidence of spillovers on the privately insured. Looking to the last three columns of Table 3, we see that there is no change in the health outcomes or access measures among the privately insured when Medicaid payments to primary care doctors increase. Not only are the coefficients all statistically insignificant, the point estimates are also generally very small.

Table 4 shows that the association between Medicaid fees and school attendance also exists in a completely different dataset: national test score data. Using data from 4th grade math tests, an increase in Medicaid fees of \$10 is associated with a precisely estimated higher fraction of children who missed zero days of school in the past month and a lower fraction of children who missed 1-2 days, 3-4 days, and 5-10 days. The 4th grade reading test absences follow a similar pattern, although the estimates are not quite as precisely estimated. These results are consistent with higher Medicaid fees improving access and health, and thus shifting 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 make sense if absences for younger children are more tightly related to health, whereas absences for older children represent truancy.

When we look at the test scores of these students (Table A.3), we find little evidence of effects of the primary care rate increase. In 4th grade, 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 improved test scores for math. For those who missed 0 days of school in the past month, 8th grade math test scores increase by 0.1 percent. It is possible that 8th grade math is particularly sensitive to either attendance or health, and that missing a few fewer days during this period or being healthier and better able to concentrate could help test scores. 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 finding effects only on math scores. However, the point estimates are very small and do not appear in in 4th grade, so the evidence of immediate improvements on test scores due to better health care access is limited.

Many aspects of the US health care system were changing at the time of the Medicaid primary care rate increase. Most relevant for this paper, Medicaid was expanded in 2014, making many low-income, single adults eligible for the first time in many states. Are the improvements in health and access measures that we observe being driven by people newly eligible for Medicaid? To explore this possibility, we look separately at states that did and did not expand Medicaid. However, since our fee variation is at the state level, this strategy sharply reduces our identifying variation. To avoid spliting by state,, we also split the sample by households with and without children, as the group that experienced the largest increase in Medicaid eligibility under the ACA is childless adults.

Figures 5 and 6 depict the point estimates from our main specification on these different subsamples. From Figure 5, it appears that the newly Medicaid eligible may be driving the increases in office visits and the decrease in fair or poor health, whereas the improvements in very good or excellent health appear to be driven by the always eligible group. In the adult subsample, the improvements in the likelihood that doctors take Medicaid, or are accepting new Medicaid patients are largest for those with children and in states that didn't expand Medicaid (see Figure 6). Finally, the effects for children seem to be nearly identical across states that did and did not expand Medicaid (Figure A.2). Poor children were already eligible for Medicaid in all states, however, and so we would not expect a compositional change after the Medicaid expansions for this group.

Finally, we look at the effect of Medicaid rates across different time periods. In particular, we estimate our main specifications using the time period before the ACA rate increase (2009-2011), during the ACA rate increase (2012-2014), and as the rate increase was phased out in some states (2013-2015). There is much less payment variation in the 2009-2011 period, as can be seen in Figure 2. In this early time period, the effects of payment rates on our access and health outcomes

are very imprecise (we removed the standard error bars for these estimates to make Figures 5 and 6 easier to read).<sup>4</sup> However, the point estimates are generally consistent both with our main results and with the point estimates exploiting just the variation from the ACA rate increase. The point estimates obtained using the reverse experiment in 2015, when some states went back to their pre-ACA fee boost levels, are also very consistent with our main results. However, the decision to maintain the higher rates may be endogenous to states' experience under the fee boost, and thus we do not use this payment variation in our main results.

If providers expect fee increases to be temporary, increasing payments could have little effect on their decision to take on new patients. That is, the uncertain duration of the increased fees could erode the policy's effectiveness. The fee bump should 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 duration of the fee increase was unknown when it was enacted, we also examine whether heterogeneity in beliefs about the expected duration impacted the effect of the policy.

However, we find no evidence that the effect of the Medicaid fee increase depends on whether states extended the payments (Table A.1). This null result could indicate that physicians placed little weight on their expectations of the duration of the fee increase—expectations about the duration of higher fees appears to be less important than the size of the payment. That physicians have a hard time forecasting payment rates may not be particularly surprising, given both the last minute announcement over federal funding for 2015, as well as the diversity in geography, demographics, and political affiliation of the states which extended the higher payments (see Figure 7).

<sup>&</sup>lt;sup>4</sup>The only case where this is not true is for the effect on trouble finding a doctor and having a usual place of care in the child subsample. For these two outcomes, the point estimates using the 2009-2011 variation are statistically significant.

## 5 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 which 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. Our results suggest that the ACA's strategy of increasing primary care reimbursement rates may be a powerful tool for both expanding access to care and improving health outcomes among the Medicaid population.

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# 6 Figures



Figure 1: New Patient Medicaid Fee Variation Across States for Primary Care Services

Note: E&M stands for evaluation and management, and is the category of fees which were increased under the ACA primary care rate increase.



Figure 2: New Patient Medicaid Fee Variation Over Time for Primary Care Services

Note: quarterly averages for each state are plotted. The top two lines are Alaska (1) and North Dakota (2), and the bottom two lines are New Jersey (50) and Rhode Island (51). E&M stands for evaluation and management, and is the category of fees which were increased under the ACA primary care rate increase.



Figure 3: Variation in Medicaid Managed Care Penetration Over Time

Notes: the fraction of Medicaid enrollees in comprehensive risk-based managed care in each state and year. Data compiled from Medicaid Manged Care Enrollment reports published by the Centers for Medicare and Medicaid Services (for 2009-2014), and the Henry J. Kaiser Family Foundation (2015). The black line is fraction of Medicaid enrollees in comprehensive risk-based managed care plans nationwide. In 2014, eleven 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 comprehensive risk-based managed care plans: Arizona, Delaware, Hawaii, Kansas, Kentucky, New Hampshire, New Jersey, Tennessee, and Washington.



Figure 4: Distribution of School Absences

Notes: The average percent of students who missed 0, 1-2, 3-4, 5-10, or 11+ days in the past month while taking state assessment tests (2009-2013). From the National Assessment of Educational Progress.



#### Figure 5: Alternate Medicaid Subsamples: Full Sample

Notes: Each dot is the coefficient on Medicaid fees in \$10 from a separate regression. The subsample is on the y-axis, and the coefficient is on the x-axis. The dashed vertical line shows the coefficient in the full sample (as reported in Table 3). The 95% confidence interval of each coefficient is also reported, with the exception of the 2009-2011 subsample—these confidence intervals are very wide, and are omitted to increase the readibility of the figures.



Figure 6: Alternate Medicaid Subsamples: Adults

Notes: Each dot is the coefficient on Medicaid fees in \$10 from a separate regression. The subsample is on the y-axis, and the coefficient is on the x-axis. The dashed vertical line shows the coefficient in the full sample (as reported in Table 3). The 95% confidence interval of each coefficient is also reported, with the exception of the 2009-2011 subsample—these confidence intervals are very wide, and are omitted to increase the readibility of the figures. Estimates are not shown for the 2009-2011 time period for in the top two panels, as these questions were only asked from 2011-2015.



Notes: The shaded states extended higher Medicaid payment rates for primary care services into 2015.

## 7 Tables

		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 N	0.566 95,786	0.728 338,114
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
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
	School days missed	11.844	7.345
	N	13,548	25,326

#### Table 1: Summary Statistics: Outcome Measures

Notes: weighted using sample weights provided by the NHIS. The sample is smaller for the days missed of school question than the other child subsample questions, because a child must be at least five years old to be asked. Similarly, the sample is smaller for the days missed of work question for the adult subsample

	All	Medicaid	Private
Avg. Medicaid new patient fee (99203w)	81.6	83	81.5
Individual level controls			
Welfare	12.7	48.3	3.5
Married	58.2	39.9	66.6
One adult, no children	13	8.8	12.6
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	58.2	45.9
Pct black	13.2	25.3	9.7
Pct Hispanic	16.7	29.6	10.1
Pct homeowner	33.4	64.6	22.3
Pct not homeowner	64.8	34.1	76
Pct income:poverty line: <1	13.8	47.6	3.6
Pct income:poverty line: 1-1.99	16.6	28.5	9.7
Pct income:poverty line: 2-3.99	25	10.9	28.6
Pct income:poverty line: 4+	29.9	2.5	43.5
Pct family size 1	13	8.8	12.6
Pct family size 2	26.2	12.8	28.4
Pct family size 3	18.2	18.5	18.6
Pct family size 4	21.1	22.1	22.7
Pct family size 5+	21.5	37.7	17.8
Educ: < high school	13.5	29.6	6
Educ: high school/GED	25.3	31.3	21.4
Educ: some college	19	18.6	19.1
Educ: assoc. degree	10.8	8.7	11.9
Educ: bachelor's degree	18.4	5.6	24.8
Educ: master/prof/phd	10.9	1.6	15.7
Pct male	48.9	43.9	48.9
Pct not US citizen	69	6.2	3.9
Pct US citizen	92.7	93.6	95.9
Average age	37.3	24.2	38.4
County level controls	5715	21.2	50.1
Unemployment rate (16+)	83	87	8.1
Medicaid eligibles	286 546	362 977	255 730
General practicioners	307	335	292
Pediatricians	234	265	222
Nurse practitioners	401	203 447	386
Population	1.126 919	1.285 041	1.050 842
Population density	2,010	3 090	1 834
Hospital beds	3 254	3 750	3 036
Median income	53 749	50 020	55 406
Expansion state (2014)	93	11.8	96
Observations	603.074	95 847	338 385
	005,074	JJ,0+1	550,505

Table 2: Summary Statistics: Individual and County Controls

Notes: weighted using sample weights provided by the NHIS.

Full sample		Medicaid			Private	
	(1)	(2)	(3)	(4)	(5)	(6)
	Office Visits	P/F Health	Ex/VG Health	Office Visits	P/F Health	Ex/VG Health
Medicaid fees,	0.0029**	-0.0021*	0.0043**	-0.0003	0.0002	0.0013
in \$10 (99203w)	(0.0012)	(0.0012)	(0.0018)	(0.0007)	(0.0004)	(0.0012)
Observations $R^2$	95736	95786	95786	337717	338114	338114
	0.072	0.296	0.233	0.037	0.079	0.138
Mean dep. var.	0.196	0.174	0.566	0.174	0.061	0.728
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,	-0.0068***	-0.0072**	0.3568	0.0001	-0.0006	-0.0580
in \$10 (99203w)	(0.0013)	(0.0029)	(0.4700)	(0.0004)	(0.0004)	(0.0764)
Observations $R^2$	14,806	14,805	6,295	80,409	80,399	77,571
	0.038	0.039	0.037	0.006	0.009	0.009
Mean dep. var.	0.055	0.075	4.927	0.016	0.022	3.731
Child Subsample		Medicaid			Private	
	(1)	(2)	(3)	(4)	(5)	(6)
	Trouble finding	No usual place	Days missed	Trouble finding	No usual place	Days missed
	doctor	of care	school	doctor	of care	school
Medicaid fees,	-0.0039***	-0.0030**	-1.7893**	0.0009	-0.0002	0.4610
in \$10 (99203w)	(0.0011)	(0.0012)	(0.7807)	(0.0006)	(0.0007)	(0.5001)
Observations $R^2$	16786	21249	13548	26454	34261	25326
	0.014	0.020	0.027	0.006	0.028	0.015
Mean dep. var.	0.021	0.028	11.844	0.008	0.020	7.345

Table 3: Effects of Medicaid	I Fees on Acces	s and Health
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Notes: weighted using NHIS sample weights. Individual controls: indicators for married, black, Hispanic, homeownership (homeowner and missing), income categories (ratio of income to poverty line <1, 1-1.99, 2-3.99, 4+, and missing), dummy variables for family size (1, 2, 3, 4, 5+), education (less than high school, high school/GED, some college, bachelor's degree, more than bachelor's degree, missing), sex, citizenship (US citizen, missing), and 5 year age bins. County-level controls: unemployment rate (16+), number eligible for Medicaid, number of APRNs, NPs, and primary care doctors, median household income, number of hospital beds, population, and population density. State and year fixed effects, and a Medicaid expansion indicator also included. Standard errors clustered at the state level.

4th Grade Math					
	(1)	(2)	(3)	(4)	(5)
	Pct. with				
	0 days	1-2 days	3-4 days	5-10 days	11+ days
	missed	missed	missed	missed	missed
Medicaid fees	0.419***	-0.104	-0.136*	-0.106*	-0.002
	(0.140)	(0.119)	(0.069)	(0.056)	(0.037)
Observations	150	150	150	150	150
$R^2$	0.892	0.722	0.842	0.652	0.783
Mean dep. var.	49.067	30.773	12.400	5.107	2.640
4th Grade Reading					
	(1)	(2)	(3)	(4)	(5)
	Pct. with				
	0 days	1-2 days	3-4 days	5-10 days	11+ days
	missed	missed	missed	missed	missed
Medicaid fees	0.275**	-0.050	-0.139*	-0.026	-0.016
	(0.115)	(0.097)	(0.071)	(0.064)	(0.035)
Observations	150	150	150	150	150
$R^2$	0.885	0.772	0.785	0.724	0.746
Mean dep. var.	49.247	30.833	12.313	5.080	2.600
8th Grade Math					
	(1)	(2)	(3)	(4)	(5)
	Pct. with				
	0 days	1-2 days	3-4 days	5-10 days	11+ days
	missed	missed	missed	missed	missed
Medicaid fees	0.267*	-0.082	-0.088	-0.063	-0.050
	(0.145)	(0.113)	(0.084)	(0.053)	(0.040)
Observations	150	150	150	150	150
$R^2$	0.875	0.803	0.840	0.761	0.766
Mean dep. var.	42.787	36.320	13.753	5.173	1.953
8th Grade Reading					
	(1)	(2)	(3)	(4)	(5)
	Pct. with				
	0 days	1-2 days	3-4 days	5-10 days	11+ days
	missed	missed	missed	missed	missed
Medicaid fees	0.211	0.082	-0.210*	-0.066	-0.024
	(0.136)	(0.104)	(0.109)	(0.064)	(0.048)
Observations	150	150	150	150	150
$R^2$	0.887	0.852	0.797	0.721	0.741
Mean dep. var.	42.927	36.647	13.513	5.080	1.787

Table 4: Effects of Medicaid Fees on School Absences

Notes: Fourth grade math test data at the state-year level from 2009, 2011, and 2013. State and year fixed effects included. Standard errors clustered at the state level.

# Appendix

## A Data Appendix

## A.1 Medicaid fees

For 44 of 50 states and Washington, DC, we have no missing data. For the remaining 6 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 regular 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 regular 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 regular rate information, but are missing a few months of the regular 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 only have the 2013 and 2014 ACA rates and the 2015 regular Medicaid rates, as rates are not archived. To impute 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.

For most states, the reimbursement rate does not depend on the age of the patient. For some states, however, physicians are paid slightly more for seeing young patients. In the states with

different rates for children and adults, pediatric rates were higher, on average. In the main analysis, we use the child rates when looking at child outcomes, and the adult rates when looking at adult outcomes. More detailed information on exactly what data we have for each state is reported in Table A.2.

### A.2 National Health Interview Survey questions

#### Person level file

- 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]

#### Sample adult file

- 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]

#### Sample child file

• 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]

## **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 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:

 $Outcome_{icst} = \beta_0 + \beta_1 Fee_{st} + \beta_2 Extended Fee Boost_s + \beta_3 Fee_{st} * Extended Fee Boost_s$ 

$$+\gamma X_i + \delta Z_{ct} + \lambda_s + \lambda_t + \epsilon_{icst}$$
(A.1)

where *Extended Fee Boost*<sub>s</sub> is an indicator denoting states that extended the fee boost in 2015 (listed in Figure 7), and all other variables are defined as in Equation (1). Here, the parameters of interest are  $\beta_1$ , the main effect of physician payments, and  $\beta_3$ , 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  $\beta_1$  would be zero and  $\beta_3$  would be significant. If, however, doctors are unable to predict the duration of the pay increase, we would expect  $\beta_3$  to be zero.

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	0.0028** (0.0012)	-0.0019 (0.0012)	0.0044** (0.0018)	-0.0002 (0.0007)	0.0002 (0.0004)	0.0014 (0.0012)
Extended Payments	-0.1021*** (0.0305)	-0.0192 (0.0339)	-0.2130*** (0.0457)	-0.0502*** (0.0122)	0.0099 (0.0072)	-0.0547** (0.0246)
Fees * Extended	-0.0013 (0.0018)	0.0024 (0.0020)	0.0005 (0.0029)	0.0017** (0.0007)	-0.0002 (0.0004)	0.0011 (0.0014)
Observations $R^2$	95,736 0.072	95,786 0.296	95,786 0.233	33,7717 0.037	33,8114 0.079	33,8114 0.138
Mean dep. var.	0.196	0.174	0.566	0.174	0.061	0.728
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	-0.0069***	-0.0071** (0.0028)	0.2852	0.0000	-0.0005	-0.0436
Extended Payments	0.0926***	-0.0015	(0.4004) 10.2786* (5.8046)	0.0044 (0.0112)	-0.0077 (0.0126)	(0.0760) -2.8540 (1.8642)
Fees (12m) * Extended	-0.0016 (0.0018)	0.0016 (0.0032)	-0.7179** (0.2869)	-0.0003 (0.0007)	0.0005 (0.0007)	0.1428 (0.1028)
Observations $R^2$	14,806 0.038	14,805 0.039	6,295 0.037	80,409 0.006	80,399 0.009	77,571 0.009
Mean dep. var.	0.055	0.075	4.927	0.016	0.022	3.731
Child Subsample		Medicaid			Private	
	(1) Trouble finding doctor	(2) No usual place of care	(3) Days missed school	(4) Trouble finding doctor	(5) No usual place of care	(6) Days missed school
Medicaid fees, in \$10	-0.0039***	-0.0029**	-1.9889***	0.0009	-0.0002	0.4689
Extended Payments	(0.0011) 0.0237 (0.0181)	-0.0143 (0.0267)	(0.7298) 43.0994*** (14.8660)	-0.0247*** (0.0073)	0.0469*** (0.0164)	(0.3093) -4.1418 (8.2670)
Fees (12m) * Extended	0.0003 (0.0010)	0.0010 (0.0015)	-2.2993** (0.8782)	-0.0000 (0.0004)	-0.0001 (0.0009)	0.0842 (0.4202)
Observations $R^2$	16,786 0.014	21,249 0.020	13,548 0.027	26,454 0.006	34,261 0.028	25,326 0.015
Mean dep. var.	0.021	0.028	11.844	0.008	0.020	7.345

Table A.1: Effects of Medicaid Fees on Access and Health: By Duration Expectations

Notes: weighted using NHIS sample weights, with same controls as Table 3. Standard errors clustered at the state level.

Somewhat surprisingly, we find no evidence that the fee increase was more effective in states which actually extended the fees in 2015. Table A.1 suggests that the effect of increasing doctor payment on patient access and health does not depend on expectations over the duration of the payment increase, as there was no significant difference in the response of physicians across states that did or did not maintain the increased rates after 2014. The only exception is that there seemed to be a larger effect of the pay increase on the number of work and school days missed in states that maintained the rate increase—perhaps because these states started out worse on both of these measures.

# **C** Supplementary Tables and Figures



Figure A.1: ACA Medicaid Expansion (as of 2014)



#### Figure A.2: Alternate Medicaid Subsamples: Children

Notes: Each dot is the coefficient on Medicaid fees in \$10 from a separate regression. The subsample is on the y-axis, and the coefficient is on the x-axis. The dashed vertical line shows the coefficient in the full sample (as reported in Table 3). The 95% confidence interval of each coefficient is also reported, with the exception of the 2009-2011 subsample—these confidence intervals are very wide, and are omitted to increase the readibility of the figures. Estimate is not shown for the 2009-2011 time period for in the top panel, as this question was only asked from 2011-2015.



Figure A.3: Average Test Scores by School Absences

Notes: The average state assessment test scores of students who missed 0, 1-2, 3-4, 5-10, or 11+ days in the past month (2009-2013). From the National Assessment of Educational Progress.

# **D** Appendix Tables

	2009	2010	2011	2012	2013	2013 ACA	2014	2014 ACA	2015	Notes	Child rate
AL	$\checkmark$		-								
AK	$\checkmark$		-								
ΑZ	$\checkmark$		-								
AR	$\checkmark$		-								
CA	$\checkmark$	-	-	-	-	$\checkmark$	-	$\checkmark$	$\checkmark$	Rates same in 2009 and 2015	$\checkmark$
CO	$\checkmark$		-								
CT	$\checkmark$		$\checkmark$								
DE	$\checkmark$		-								
DC	$\checkmark$		-								
FL	$\checkmark$		$\checkmark$								
GA	$\checkmark$		-								
HI	$\checkmark$	-	-	-	$\checkmark$	$\checkmark$	-	$\checkmark$	$\checkmark$	Rates same in 2009 and 2013	-
ID	$\checkmark$		-								
IL	$\checkmark$		-								
IN	$\checkmark$		-								
IA	$\checkmark$		-								
KS	$\checkmark$		-								
KY	$\checkmark$		-								
LA	1	$\checkmark$	$\checkmark$	$\checkmark$	1	$\checkmark$	$\checkmark$	1	√ √		$\checkmark$
ME	1	1	1	1	1	1	1	1	1		_
MD	√					, ,	√	√			-
MA	· √							√			-
MI	· √							√			-
MN	· √							√			-
MS	· √							√			-
MO	•	•	•	•		• ./	•	•	•		_
MT	•	•	•	•		• ./	•	•	•		_
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Table A.2: Description of Medicaid Rate Data

4th Grade Math					
	(1)	(2)	(3)	(4)	(5)
	Test scores	Test scores	Test scores	Test scores	Test scores
	0 days	1-2 days	3-4 days	5-10 days	11+ days
	missed	missed	missed	missed	missed
Medicaid fees	-0.157	-0.258	-0.343	0.251	0.210
	(0.163)	(0.201)	(0.267)	(0.268)	(0.544)
Observations	150	150	150	150	133
$R^2$	0.951	0.948	0.906	0.889	0.780
Mean dep. var.	244.547	240.395	234.898	233.547	218.007
4th Grade Reading					
	(1)	(2)	(3)	(4)	(5)
	Test scores	Test scores	Test scores	Test scores	Test scores
	0 days	1-2 days	3-4 days	5-10 days	11+ days
	missed	missed	missed	missed	missed
Medicaid fees	-0.009	0.096	0.107	-0.513	0.334
	(0.134)	(0.141)	(0.265)	(0.451)	(0.888)
Observations	150	150	150	150	131
$R^2$	0.962	0.949	0.903	0.866	0.724
Mean dep. var.	224.185	220.928	216.108	213.696	192.338
8th Grade Math					
	(1)	(2)	(3)	(4)	(5)
	Test scores	Test scores	Test scores	Test scores	Test scores
	0 days	1-2 days	3-4 days	5-10 days	11+ days
	missed	missed	missed	missed	missed
Medicaid fees	0.400**	0.244	0.416*	-0.140	-0.116
	(0.172)	(0.156)	(0.221)	(0.294)	(1.221)
Observations $R^2$ Mean dep. var.	150 0.968 288.665	150 0.966 284.352	150 0.938 273.929	150 0.862 270.138	64 0.788 254.282
8th Grade Reading					
	(1)	(2)	(3)	(4)	(5)
	Test scores	Test scores	Test scores	Test scores	Test scores
	0 days	1-2 days	3-4 days	5-10 days	11+ days
	missed	missed	missed	missed	missed
Medicaid fees	0.211	-0.049	0.063	-0.231	1.563*
	(0.153)	(0.121)	(0.228)	(0.396)	(0.852)
Observations $R^2$	150	150	150	150	55

Table A.3: Effects of Medicaid Fees on Test Scores: 4th Grade Math

Notes: Fourth grade math test data at the state-year level from 2009, 2011, and 2013. State and year fixed effects included. Standard errors clustered at the state level.

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

Table A.4: Medicaid Managed Care to Fee-for-Service Ratios (from GAO)

Notes: from Yocom (2014).

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