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THE RESPONSIVENESS OF MEDICAID SPENDING TO THE FEDERAL SUBSIDY

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ABSTRACT

Although economic theory suggests that the federal government can influence spending by states through subsidies to programs that states operate, no recent work has quantified the magnitude of this effect for Medicaid, the largest program of this type in the U.S. We find that Medicaid spending per enrollee responds to the magnitude of the federal subsidy. The Affordable Care Act (ACA) and its subsequent interpretation by the Supreme Court gave states the option to expand eligibility for their Medicaid programs in exchange for increases in the generosity of the federal subsidy. States that exercised this option increased Medicaid spending per enrollee on enrollees who were eligible even before the ACA by approximately 15 percent. Depending on the specification, this translates into an elasticity of Medicaid spending per enrollee with respect to the after-subsidy price of Medicaid to a state of -0.494 to -0.579.

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Introduction

The U.S. federal government can influence spending by state governments with regulations, mandates, and intergovernmental incentives. During the post-war period, the rapid growth in state spending was driven primarily by increasing use of such policies, particularly in the areas of health, education, and welfare (Baicker, Clemens, and Singhal 2012).

The largest example of this phenomenon is Medicaid, which supplies health services to low-income people. States that choose to participate in Medicaid (all states have) must cover certain populations and may cover others. Similarly, states that choose to participate in Medicaid must provide a minimum set of benefits, but may provide optional benefits in excess of the mandatory minimum. States also have significant discretion over how care is delivered and how much providers are paid. These policy choices have led to significant variation in Medicaid spending across states (Young, Rudowitz, Rouhani, et al. 2015).

At the same time, Medicaid is financed jointly by the federal and states' governments according to a statutory formula (Congressional Research Service 2020b). The formula specifies for each state the rate at which each dollar of Medicaid spending will be subsidized by the federal government. This subsidy rate, called the Federal Medical Assistance Percentage (FMAP), varies inversely with a state's per capita income. In 2018, for example, FMAPs ranged from 50 percent (for high-income states like California and New York) to 76 percent (for Mississippi). With a 76 percent matching rate, for every dollar the state of Mississippi spends on Medicaid, the state pays only 24 cents from its own funds. This subsidy to states is open-ended: within the statutory guidelines regarding covered population and services, states are able to receive funds at their FMAP rate without limit, depending on how much the state chooses to spend (Congressional Research Service 2020b).

The magnitude of the elasticity of Medicaid spending with respect to the FMAP (or conversely, with respect to the after-FMAP price of spending) is central to several current policy debates. As Chernick (1998) shows, the elasticity is a key input predicting how Medicaid spending will respond to changes in program structure such as per capita spending caps or block grants. In addition, as Craig and Howard (2014) observe, the elasticity determines the extent to which state government responses to the federal subsidy may have caused states to shift spending to Medicaid from other social programs.

Yet, despite this, no recent work has quantified this elasticity. This gap in the literature is likely due to the fact that the FMAP is a function of states' per capita income. Because a state's per capita income is also a possible determinant of its Medicaid program generosity, OLS estimates of the elasticity may be biased if the functional form of the relationship between state income and Medicaid generosity is not correctly specified.

In this paper, we evaluate the impact of a decrease in the after-FMAP price of Medicaid due to the Affordable Care Act (ACA). The ACA required states to extend Medicaid eligibility to all adults younger than 65 with incomes less than 133% of the Federal Poverty Line (FPL). In 2012, the US Supreme Court made the expansion optional.¹ As of January, 2018, 31 states and the District of Columbia had opted to expand.² Enrollees to whom the ACA extended eligibility are known as “expansion” enrollees and the states that opted to expand are known as “expansion” states. The ACA gave expansion enrollees a higher FMAP than the state's standard FMAP. This higher FMAP is known as the “enhanced” FMAP.

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¹ <https://www.macpac.gov/subtopic/medicaid-expansion/>

² <https://www.kff.org/health-reform/state-indicator/state-activity-around-expanding-medicaid-under-the-affordable-care-act/>.

Ideally, we would estimate the effect of the decrease in the after-FMAP price on the spending of enrollees by comparing enrollees who received an enhanced FMAP to those who did not. However, the types of enrollees who received the enhanced FMAP – that is, expansion enrollees – were not generally Medicaid eligible pre-ACA. Prior to the ACA, Medicaid eligibility was generally limited to low-income children and their parents, pregnant women, people with disabilities and people age 65 and over. The ACA’s Medicaid expansion extended eligibility to all low-income working age adults. Thus, the expansion population does not have comparable counterparts who were Medicaid eligible in non-expansion states. This means that there is no natural “control” group against which to compare expansion enrollees’ post-ACA experience.

For this reason, in this paper we examine the spending of *non-expansion* enrollees. Although these enrollees did not receive the enhanced FMAP, it may have nonetheless affected their spending: as we discuss below, the vast majority of expansion states opted to provide expansion enrollees the same benefit package as non-expansion enrollees. Thus, increases in program generosity in response to the enhanced FMAP have the potential to affect spending on non-expansion as well as on expansion enrollees.

We begin with a reduced-form OLS model which specifies the effect of expansion as the difference in trends in spending per non-expansion enrollee in expansion states versus non-expansion states, after versus before expansion. Then, we specify an instrumental-variables model of the effect of the after-FMAP price on spending, using expansion as the instrument. As we explain below, interpreting our estimates as the effect of the expansion-induced decrease in the after-FMAP price depends on the assumptions that (1) states offer a single Medicaid benefits package that depends on the average after-FMAP price to all enrollees and (2) conditional on

observables, expansion affects non-expansion enrollee spending only through its effect on the FMAP. We explore the validity of these assumptions below.

This paper proceeds in four sections. Section I provides a brief review of the literature. Section II provides background on Medicaid and describes our models and data. Section III presents our results, and Section IV concludes.

I. Previous Literature

A long literature in public finance suggests that the Medicaid program's design promotes higher spending. Orr (1976) formalizes this hypothesis with a model of the Aid to Families with Dependent Children (AFDC) program. The AFDC program operated on much the same basis as Medicaid does today: states had discretion over benefit generosity with their program spending partially financed by the federal government according to matching formula. Orr (1976) concludes that states, seeking to appeal to their median taxpayer's desire for social insurance, would increase AFDC generosity in response to the matching rate. Using exogenous variation in the AFDC matching rate, Baicker (2005) proves Orr's (1976) hypothesis, finding an elasticity of the generosity of AFDC benefits with respect to the matching rate of 0.38.

Baicker, Clemens, and Singhal (2012) expand on this work to examine the effect of intergovernmental transfers on state social spending more generally. They demonstrate that much of the dramatic growth in state social spending over the postwar period has been due to the features of federal conditional matching grants – like those of Medicaid.

Yet, except for Grannemann and Pauly (1983),³ there have been no published estimates of the effect of the FMAP on Medicaid spending. This gap in the literature may be due to the possible endogeneity of the FMAP, which is a function of states' per capita income.

Unfortunately, neither the ACA nor previous changes to Medicaid provide a clean experiment like the one in Baicker (2005), where otherwise similar cohorts of AFDC enrollees received different changes in their matching rate. As we discuss above, this means that there is no obvious natural experiment with which to evaluate the effect of the Medicaid matching rate on spending.⁴ For this reason, we estimate the effect of the enhanced FMAP on enrollees who did not receive it, but were indirectly affected by it by virtue of the fact that the vast majority of expansion states opted to provide expansion enrollees the same benefit package as non-expansion enrollees.

II. Background on Medicaid, Models, and Data

A. Background on Medicaid

Before 2014, the FMAP for state i in year t was equal to

$$1 - \left[\left(\frac{Y_{i,t-3}}{Y_{t-3}} \right)^2 \times 0.45 \right]$$

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³ Grannemann and Pauly (1983) Table 9 report earlier regression estimates from Grannemann of the effect of the FMAP holding constant other determinants of state Medicaid expenditures, eligibility, and benefits based on a voter-choice model of state behavior.

⁴ Not-newly-eligible expansion enrollees could be in theory retroactively identified in expansion states, which would enable their spending to be compared after versus before receiving the enhanced FMAP. For example, Wisconsin (a non-expansion state) had extended eligibility to individuals based on income less than 100% of the FPL (a group of individuals comparable to not-newly-eligible expansion enrollees), which would enable the trends in spending on not-newly-eligible expansion enrollees in expansion states to be compared to the spending on a similar cohort in at least one non-expansion state (Brooks, Roygardner, Artiga, et al., 2020). We were not able to obtain aggregate data on Medicaid spending at a sufficient level of detail to identify separately these enrollees from the general Medicaid population; whether it is possible to identify them using historical individual-level claims and enrollment data is an important question for future research.

with a statutory minimum of 0.5 and a statutory maximum of 0.83, where $Y_{i,t-3}$ is the three-year lagged moving average of the per capita income in s from years $t-3$, $t-4$, and $t-5$ and Y_{t-3} is the three-year lagged moving average of US per capita income for the same years.⁵

As we discuss above, the ACA established an enhanced FMAP for expansion enrollees as of January 1, 2014. The enhanced FMAP depended on whether the expansion enrollee was “newly eligible” or “not newly eligible.” Newly-eligible expansion enrollees are those who were not eligible for Medicaid in the state as of December 1, 2009; not-newly-eligible expansion enrollees are those who were eligible for Medicaid in the state as of March 23, 2010 because their income was less than 100% of the FPL (i.e., exclusive of individuals who were categorically eligible for reasons other than income).

The enhanced FMAP for newly-eligible expansion enrollees was 100% in 2014-2016, 95% in 2017, 94% in 2018, 93% in 2019, and 90% in 2020 and later. The enhanced FMAP for not-newly-eligible expansion enrollees was the state’s standard FMAP, plus the difference between the newly-eligible expansion enrollee enhanced FMAP and the state’s standard FMAP, multiplied by a transition factor τ , where $\tau = 0.5$ for 2014, 0.6 for 2015, 0.7 for 2016, 0.8 for 2017, 0.9 for 2018 and 1 for 2019 and later.⁶

Thus, in non-expansion states, there is a single FMAP, but in expansion states, there are three different FMAPs, each of which applies to a distinct population of enrollees. In non-expansion states, the after-FMAP price of Medicaid is equal to 1 – the state’s standard FMAP. In expansion states, the after-FMAP price of Medicaid is equal to 1 – the weighted average of the three FMAPs, with the weights equal to the share of non-expansion, newly-eligible expansion, and not-newly-eligible expansion enrollees (respectively) in the Medicaid population.

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⁵ With certain exceptions, described in detail in Congressional Research Service (2020a).

⁶ <https://www.macpac.gov/subtopic/state-and-federal-spending-under-the-aca/>.

B. Models

Model (1) identifies β , the reduced-form effect of expansion on spending in state i at year t :

$$\ln(S_{it}) = \alpha_i + \theta_t + E_{it}\beta + \gamma Z_{it} + \delta X_{it} + \varepsilon_{it} \quad (1)$$

where S_{it} is Medicaid spending per full-year-equivalent non-expansion enrollee; α_i is a state fixed effect; θ_t is a year fixed effect; E_{it} is an indicator variable =1 if state i in year t had expanded Medicaid, 0 otherwise; Z_{it} is a vector of state Medicaid enrollment variables, including the share of enrollees who are children, who are dually enrolled in Medicare, and who are enrolled in a Medicaid managed care plan; X_{it} is a vector of state characteristics that may affect S_{it} , including hospital beds per capita, physicians per capita, primary care physician per capita, the poverty rate, and the unemployment rate; and ε_{it} is an error term.

Model (2) identifies λ , the effect of the after-FMAP price on spending:

$$\ln(S_{it}) = \alpha_i + \theta_t + \lambda \ln(1 - FMAP_{it}) + \gamma Z_{it} + \delta X_{it} + \varepsilon_{it} \quad (2)$$

where

$$FMAP_{it} = \sigma_{1it}FMAP1_{it} + \sigma_{2it}FMAP2_{it} + \sigma_{3it}FMAP3_{it}$$

and $FMAP1_{it}$, $FMAP2_{it}$, and $FMAP3_{it}$ and σ_{1it} , σ_{2it} , and σ_{3it} are the FMAPs and population shares for non-expansion, newly-eligible expansion, and not-newly-eligible expansion enrollees, respectively. We estimate (2) by instrumental variables, using E_{it} as an instrument for $\ln(1 - FMAP_{it})$, and by OLS (for comparison purposes).⁷

As we acknowledge above, interpreting our estimates as the effect of the expansion-induced decrease in the after-FMAP price depends on two assumptions. First, we assume that states offer a single Medicaid benefits package that depends on the average after-FMAP price to

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⁷ Ideally, we would estimate separately the effects of the three FMAPs on spending, but because we have only one instrument, this is not possible.

all enrollees. This assumption may be incorrect. The ACA did not require states to give expansion enrollees traditional Medicaid coverage, but rather only a (less-generous) Alternative Benefit Plan (ABP). The law allowed states' ABPs to be modeled on commercial insurance, which would seem to violate this assumption. To the extent that states exercised this option, spending on non-expansion enrollees might not depend on changes in the after-FMAP price for expansion enrollees. However, although the ACA allowed states to offer expansion enrollees an ABP, as of January 2018 only seven of the 31 states and the District of Columbia had chosen an ABP that differed from their traditional Medicaid benefit plan.⁸ We estimate models (1) and (2) with and without these states in order to investigate whether our assumption of a single benefits package is important.

Second, we assume that expansion affects non-expansion enrollee spending only through its effect on the FMAP. Although this assumption is standard in a large literature evaluating the effects of the expansion (Soni, Wherry, and Simon 2020), it also may be incorrect. Some expansion states reclassified some non-expansion enrollees as not-newly-eligible (expansion) enrollees after expansion, whereas non-expansion states (because they did not expand) did not. Because the average not-newly-eligible expansion enrollee (in those expansion states that had not-newly-eligible expansion enrollees) has lower spending than the average non-expansion enrollee (\$4,028 as compared to \$9,444, not in any table) removal of not-newly-eligible expansion enrollees from the non-expansion group in expansion states after expansion may bias reduced-form estimates of the effect of expansion and instrumental-variable estimates of the effect of the after-FMAP price. We estimate models (1) and (2) with and without states that

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⁸ Arkansas, Indiana, Iowa, New Hampshire, New Mexico, North Dakota, and Pennsylvania. See CRS (2018). In addition, even though these seven states obtained formal permission from CMS to provide expansion enrollees with an ABP, the extent to which their ABP differed from their traditional Medicaid coverage in practice is uncertain.

reported some not-newly-eligible enrollees⁹ in order to investigate whether the presence of not-newly-eligible enrollees was important.

C. Data

We obtain data from eight sources:

- Data on Medicaid spending and enrollment are from MACStats (for 2010-13) and Medicaid.gov (for 2015-18).¹⁰ These sources provide full-year equivalent information for all enrollees (for 2010-13 and 2015-18), not-newly-eligible expansion enrollees (for 2015-18), and newly-eligible expansion enrollees (for 2015-18). For 2015-18, we calculate spending and enrollment of non-expansion enrollees to be the difference between that of all enrollees and that of not-newly-eligible plus newly-eligible expansion enrollees.
- Data on states' Medicaid expansion status and standard FMAPs are from the Kaiser Family Foundation.
- Data on the unemployment rate and on the CPI-U (used to deflate Medicaid spending) are from the Bureau of Labor Statistics.
- Data on the poverty rate and state population are from the Census Bureau.
- Data on Medicaid managed care enrollment are from MACStats (for 2010-13 and 2015-16) and the Kaiser Family Foundation (for 2017-18).¹¹
- Data on the number of hospital beds, physicians, and primary care physicians are from the Health Resources and Services Administration Area Health Resources Files, except for data

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⁹ Alaska, Arkansas, Arizona, Colorado, Connecticut, DC, Delaware, Hawaii, Iowa, Illinois, Indiana, Massachusetts, Michigan, Minnesota, North Dakota, New Hampshire, New York, Ohio, Oregon, Pennsylvania, Vermont, Washington.

¹⁰ We used MACStats for 2010-13 because data were not available from Medicaid.gov for these years.

¹¹ We used the Kaiser Family Foundation for 2017-18 because data from MACStats, which were more comprehensive, were not available for these years.

on the number of physicians and primary care physicians from 2018, which are from the AAMC State Physician Workforce Data Report.

- Data on Medicare/Medicaid dual enrollment are from CMS.
- Data on the number of full-year equivalent child enrollees are from MACStats (for 2010-13) and the Kaiser Family Foundation and Medicaid.gov (for 2015-18). Because the data on Medicaid spending and enrollment exclude CHIP, we sought to identify the number of child enrollees excluding CHIP enrollees, but data on child enrollees excluding CHIP enrollees was only available for 2010-13. For 2015-18, we estimate the number of full-year equivalent child enrollees excluding CHIP to be equal to the average monthly child enrollment including CHIP (from the Kaiser Family Foundation) multiplied by the share of children ever enrolled in Medicaid excluding CHIP (from Medicaid.gov).

All of our data are publicly available in electronic form. We provide detailed references for the data (including how to download them and to construct the analysis variables in our analysis) in the Appendix along with our final data set in Excel form.

Table 1 presents means and standard deviations for these variables separately for expansion and non-expansion states for 2010-13. The table shows that Medicaid programs in expansion states differ from those in non-expansion states. Prior to expansion, expansion states spent more per full-year equivalent non-expansion enrollee and had larger Medicaid programs, despite having smaller populations. Expansion states' Medicaid programs had proportionately fewer child enrollees, but more dual enrollees and greater Medicaid managed care penetration. In addition, the supply of physicians and hospital beds in expansion states differ from those in non-expansion states. However, the economic circumstances affecting Medicaid enrollment in

expansion versus non-expansion states, as measured by the poverty and unemployment rates, were relatively similar.

III. Results

Figures 1 and 2 present our key result in graphical form. The Figures graph the estimated coefficients on β from a model analogous to (1), but substituting for E_{it} a seven-element vector with indicator variables =1 for expansion states two, three, and four or more years pre-expansion (one year pre-expansion is the omitted group) and one, two, three, and four years post-expansion. (There is a gap between one year pre-expansion and one year post-expansion because data from 2014 is unavailable. To make states that expanded in years other than 2014 comparable to those that expanded in 2014, we omitted data from them in the year they expanded.) Figure 1 presents estimates from a model based on all 50 states and the District of Columbia; Figure 2 presents estimates from a model that omits the 23 states that had an ABP or reported any not-newly-eligible enrollees post-expansion.

Figures 1 and 2 show that, in the four years before expansion, there was no significant upward trend in spending in expansion relative to non-expansion states. If anything, in the restricted sample of 27 states and DC (Figure 2), there was a slight downward trend, but spending did not differ between expansion and non-expansion states in any year two or more years before expansion. One year after expansion, however, spending in expansion states did differ significantly from spending in non-expansion states. In the full sample of all 50 states and DC (Figure 1), spending in the year after expansion was approximately 13.6 percent higher (standard error 0.030); in the restricted sample (Figure 2), spending in the year after expansion was approximately 15 percent.

Table 2 reports estimates of β from model (1), the reduced-form effect of expansion on spending, for states with and without an ABP and not-newly-eligible enrollees. Based on the full sample of all 50 states and DC, spending on non-expansion enrollees in expansion states was approximately 15.4 percent greater than spending in non-expansion states, after versus before expansion (column (1)). Table 2 shows that estimates of β are not sensitive to the assumption of a unitary benefits package or to the reclassification of non-expansion as not-newly-eligible expansion enrollees. The reduced-form estimate of the effect of expansion stays almost the same when states with ABPs and/or not-newly-eligible enrollees are excluded from the sample. Excluding the seven states with ABPs reduces the estimated effect of expansion by 0.4 percentage points (column (2), 0.154 versus 0.150); excluding the 22 states with not-newly-eligible enrollees reduces the estimated effect by 1.9 percentage points (column (3)); and excluding states with either feature reduces the estimated effect by 0.8 percentage points (column (4)).

Column (5) of Table 2 presents estimates from a model that excludes states that adopted the expansion after 2014 (Alaska and Indiana adopted in 2015; Louisiana and Montana adopted in 2016). As Goodman-Bacon (2018) shows, differences-in-differences estimates that exploit variation across groups that receive treatment at different times may be biased. The fact that the estimate in column (5) is almost identical to the estimate in column (1) shows that our estimates do not suffer from this problem.

Table 3 reports estimates of λ from model (2), the effect of the after-FMAP price on spending. Columns (1) – (3) present estimates based on the full sample of all 50 states and DC. Estimates of λ are insensitive to the potential endogeneity of the FMAP. The OLS estimate is -0.463 (standard error 0.094, column (1)), versus an IV estimate of -0.579 (standard error 0.100,

column (3)). There is no evidence that the similarity of the IV to the OLS estimate is due to weak-instrument bias in the IV estimate. The t-statistic on the excluded instrument is 12.1 (= $0.266 / 0.022$, column (2)), far in excess of threshold below the instrument would be generally considered to be weak (Angrist and Pischke 2009, Section 4.6.4).

Estimates of λ are also insensitive to our assumption of a unitary benefits package and the reclassification of non-expansion as not-newly-eligible expansion enrollees. Estimates in columns (4) – (6), which are based on states with neither not-newly-eligible enrollees nor an ABP, remain statistically significant and are statistically indistinguishable in magnitude from estimates in columns (1) – (3).

To investigate the sensitivity of our results to our specification of X_{it} , we estimated an alternative model that included two additional variables in X_{it} to capture the time-varying preferences of state electorates for spending on Medicaid: the three-year-lagged moving average of state per capita income (on which the FMAP depends)¹² and the partisan composition of the state legislature.¹³ Including these additional variables has a minimal effect on our estimates. The OLS estimate of the effect of λ from model (2) increased in magnitude to -0.517 (standard error 0.102, compare to Table 3, column (1)) and the IV estimate decreased in magnitude to -0.574 (standard error 0.100, compare to Table 3, column (3)).

One potential remaining concern is that expansion states may have misclassified some non-expansion enrollees as expansion enrollees. States have an incentive to do this in order to obtain the enhanced FMAP on enrollees who would not otherwise receive it. A series of audits by the Office of Inspector General of HHS (2018, 2019) indicates that this occurred. These

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¹² As reported by the Bureau of Economic Analysis, series SAINC1.

¹³ We specify the partisan composition of the state legislature as the sum of the shares of Democrats in the state house and senate, as reported on the National Council of State Legislatures website.

audits found that California, New York, and Colorado misclassified some non-expansion as newly-eligible expansion enrollees. Because (as we show below) the average misclassified non-expansion enrollee has lower spending than the average correctly classified non-expansion enrollee, removal of misclassified non-expansion enrollees from the non-expansion group in expansion states after expansion may bias upwards our estimate of the effect of the enhanced FMAP.

True non-expansion enrollee spending in non-expansion states after expansion is $S^* = (1 - \sigma)S' + \sigma S''$, where S' is the observed average spending per non-expansion enrollee, S'' is average spending per reclassified non-expansion enrollee, and σ is the share of reclassified non-expansion enrollees. Thus the upward bias of the effect of expansion on observed spending β is $S' - S^* = \sigma(S' - S'')$.

To estimate an upper bound on the magnitude of this bias, we estimate an upper bound on σ and a lower bound on S'' . We estimate an upper bound on the number of misclassified non-expansion enrollees to be equal to the product of the share of newly-eligible enrollees who were misclassified in Colorado (0.083)¹⁴ and the count of newly-eligibles in all expansion states after expansion (not in any table, 11,696,584), or 970,816. Expressed as a share of the count of non-expansion enrollees in all expansion states after expansion (not in any table, 38,296,869), this translates into an upper bound on σ of 0.025 ($= 970,816 / 38,296,869$). We estimate a lower bound on S'' as the product of the ratio of Colorado's misclassified newly-eligibles' spending to its observed newly-eligibles' spending (0.242)¹⁵ and the average spending on newly-eligibles in expansion states after expansion (not in any table, \$6,366 in constant 2018 dollars), or \$1,585.

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¹⁴ According to OIG HHS (2019) p.7, Colorado had misclassified the highest proportion of newly-eligibles.

¹⁵ According to OIG HHS (2019), Colorado had the lowest ratio of spending on misclassified newly-eligibles to all newly-eligibles.

Because $S' = \$9,444$ (not in any table, in constant 2018 dollars), an upper bound on the bias of the effect of expansion on observed spending β is $\sigma(S' - S'')$, or 0.021. Intuitively, the small magnitude of the upper bound on this bias is due to the fact that even material reclassification, as a proportion of the count of newly-eligibles, is dwarfed by the much larger base of non-expansion enrollees.

Expansion may affect spending per enrollee in two ways: higher reimbursement rates for providers, or more generous benefits for beneficiaries. To investigate the relative importance of these two potential mechanisms, we estimated (1) and (2), substituting for $\ln(S_{it})$ the log of the index of Medicaid benefit generosity constructed by Fox, Feng, Zeitlin, and Howell (2020). This index, based on detailed information from the Kaiser Family Foundation's State Health Facts on Medicaid and CHIP, measures whether certain optional benefits are covered (e.g., dental, hearing aids, eyeglasses, physical therapy) and whether copayments are required for each benefit. The reduced-form effect on benefit generosity of expansion (in the reduced-form model (1)) was negative, small in magnitude and statistically insignificant -- -0.039 (standard error 0.045).¹⁶ This suggests that expansion affects spending largely through increases in reimbursement rates paid to providers.

IV. Conclusion

Although economic theory suggests that the federal government can influence state spending through subsidies to state programs, no recent work has quantified the magnitude of this effect for Medicaid. Because Medicaid is a substantial share of state and federal budgets,

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¹⁶ In the IV model (2), the effect of the after-FMAP price was positive and statistically insignificant.

identifying the consequences of Medicaid's financing system on its spending is an important unresolved economic and policy question.

We find that spending per enrollee on Medicaid is responsive to the magnitude of the federal subsidy. We evaluate the impact of an increase in the FMAP due to the Affordable Care Act (ACA). The nature of the increase makes evaluation of it difficult. The "enhanced" FMAP generally was received only by a new group of enrollees in states that opted to expand Medicaid -- enrollees who were generally previously not Medicaid eligible and did not have comparable counterparts in the program who did not receive the enhanced FMAP. This means that there is no natural "control" group against which to compare these "expansion" enrollees' experience.

Instead, we examine the impact of the enhanced FMAP for newly-eligible enrollees on those who were already eligible for Medicaid prior to the expansion. Our approach is based on the fact that the vast majority of expansion states committed to providing a benefit package for expansion enrollees equivalent to the package given to Medicaid enrollees more broadly, including enrollees who were not part of the expansion. This feature of states' Medicaid programs enables us to estimate the effect of the FMAP on spending by analyzing its effect on non-expansion enrollees.

We find that the enhanced FMAP adopted by the ACA increased Medicaid spending per non-expansion enrollee, holding other factors constant. According to a reduced-form model, expansion increased spending per non-expansion enrollee by approximately 15 percent. The effect of the enhanced FMAP on spending occurred almost exactly contemporaneously with its adoption; differences in pre-existing trends in spending in expansion versus non-expansion states are very small.

We find that none of the sources of potential bias in our estimates were empirically important. We find no material evidence of bias due to selected states offering expansion enrollees an ostensibly different benefits package than non-expansion enrollees or to expansion states' reclassification of non-expansion as not-newly-eligible enrollees. Exclusion from the sample of expansion states with an ABP and/or with not-newly-eligible enrollees had no material effect on our reduced-form estimates. In addition, at most 2 percentage points of our reduced-form estimate is due to states' misclassification of non-expansion as expansion enrollees in order to obtain the enhanced FMAP.

We also estimate the elasticity of Medicaid spending per non-expansion enrollee with respect to the after-FMAP price. OLS estimates of the elasticity ranged from -0.241 to -0.463, depending on the sample of states; IV estimates ranged from -0.494 to -0.579. We find no evidence of bias due to weak instruments. All of these estimates were statistically significant at the 5 percent level, although the standard errors of the estimates were sufficiently large that for a given sample, the OLS estimates were statistically indistinguishable from the IV estimates, and across samples, the OLS and the IV estimates were each statistically indistinguishable.

Our results are consistent with a long literature in public finance documenting the expenditure-increasing effects of open-ended matching grants. In fact, the confidence intervals around our estimates of the elasticity of Medicaid spending with respect to the after-FMAP price include the elasticity of the generosity of states' AFDC benefits with respect to the price of 0.38 estimated by Baicker (2005).

Our results are also consistent with more recent work, such as Gruber and Sommers (2020ab), that finds no significant effect on state budgets of the ACA's Medicaid expansion. We estimate that expansion increased spending per non-expansion enrollee in expansion states

by approximately 15 percent (Table 2) in 2018, which translates into \$1,340 per enrollee ($= 0.15 \times \$8,936$ (Table 1)), or \$1.6 billion for the average expansion state ($= \$1,340 \times 1,174,963$ non-expansion enrollees in 2018 (not in any table)). In addition, expansion led to (new) spending by expansion states on expansion enrollees, equal to the product of the number of expansion enrollees and the spending per expansion enrollee. As explained above, there are two types of expansion enrollees, newly-eligible and not-newly-eligible. In 2018, the average expansion state had 381,753 newly-eligible expansion enrollees on which it spent \$6,682 per enrollee (not in any table), for a total of \$2.6 billion ($= 381,753 \times \$6,682$), and 91,444 not-newly-eligible enrollees on which it spent \$4,717 per enrollee (not in any table), for a total of \$431 million ($= 91,444 \times \$4,717$).

However, only a fraction of these expenditures came from state budgets. State budgets were responsible for 0.42 of the spending on non-expansion enrollees, because the average standard FMAP in expansion states in 2018 was 0.58 (not in any table), which resulted in a budget cost to the average expansion state of approximately \$672 million ($= (1 - 0.58) \times \$1.6$ billion); 0.06 of the spending on newly-eligible expansion enrollees because in 2018 the enhanced FMAP for newly-eligibles was 94%, which resulted in a budget cost of \$156 million ($= (1 - 0.94) \times \$2.6$ billion); and 0.087 of the spending on not-newly-eligible expansion enrollees because in 2018 the enhanced FMAP for not-newly-eligibles was 0.913 ($= 0.9 \times (0.94 - 0.58) + 0.58$), which resulted in a budget cost of \$37 million ($= (1 - 0.913) \times \$431$ million). Expressed as a share of state spending from state funds of \$26.8 billion (Gruber and Sommers 2020a, Table 1), this amounts to an increase in state spending of 3.2 percent ($= (\$672 \text{ million} + \$156 \text{ million} + \$37 \text{ million}) / \$26.8 \text{ billion}$). The estimates on which Gruber and Sommers (2020b) base their claim of no significant budget consequences of expansion, however, have a 95

percent confidence interval that appears to include a 12 percent increase in state spending in 2018 (Gruber and Sommers 2020b, panel B), or more than three times the magnitude of the impact implied by our estimate.

Our analysis does not indicate whether an enhanced FMAP, or the combination of an enhanced FMAP and an enrollment expansion, increase or reduce social welfare. As Baicker, Clemens, and Singhal (2012) observe, program spending induced by intergovernmental transfers may or may not be optimal. Future work might use the approach we present in this paper to investigate the benefits of Medicaid spending due to the enhanced FMAP as well as the costs.

**Table 1: Means and Standard Deviations of Variables Used In Analysis
2010 - 2013 (before expansion)**

	Expansion states	Non-expansion states
Spending per non-expansion enrollee (2018 \$)	\$8,936 (2,211)	\$7,566 (1,230)
Total enrollment ('000)	1,175 (1,737)	1,000 (1,006)
Population ('000)	6,090 (7,227)	6,332 (6,394)
Share child enrollment	0.477 (0.101)	0.545 (0.075)
Child enrollment missing	0.016 (0.125)	0
Share dual enrollment	0.159 (0.035)	0.175 (0.034)
Medicaid managed care penetration	0.502 (0.342)	0.348 (0.332)
Physicians per 100 pop	0.258 (0.085)	0.203 (0.028)
Primary care physicians per 100 pop	0.073 (0.014)	0.061 (0.009)
Hospital beds per 100 pop	0.264 (0.084)	0.298 (0.087)
Poverty rate	0.140 (0.035)	0.146 (0.032)
Unemployment rate	0.081 (0.020)	0.076 (0.020)

Figure 1

Figure 2

**Table 2: Effects of Expansion
on Ln(Spending Per Non-Expansion Enrollee)**

	(1)	(2)	(3)	(4)	(5)
Expansion state* after expansion	0.154*** (0.029)	0.150*** (0.034)	0.135** (0.050)	0.146** (0.061)	0.151*** (0.061)
Share dual enrollees	3.749*** (0.515)	4.059*** (0.527)	3.403*** (0.648)	3.836*** (0.626)	3.471*** (0.524)
Share child enrollees	-0.027 (0.238)	-0.129 (0.272)	0.072 (0.370)	-0.213 (0.515)	-0.072 (0.257)
Sample	All states	States w/o ABP	States w/o not-newly- eligibles	States w/o ABP and w/o not- newly- eligibles	States expanding after 2014
N	401	346	227	219	373
Number of states	51	44	29	28	47

Notes: Dependent variable = ln(spending per non-expansion enrollee). Missing spending and enrollment data for Maine in 2011, Rhode Island in 2013, and Tennessee in 2011. Spending omitted for Alaska and Indiana in 2016, and for Louisiana and Montana in 2017 from models underlying columns (1) – (4). Also includes controls for child enrollment missing, Medicaid managed care penetration, hospital beds per capita, physicians per capita, primary care physicians per capita, poverty rate, unemployment rate, state and time fixed effects. Standard errors clustered by state.

**Table 3: Effects of the Price of Medicaid Benefits to States
on Ln(Spending Per Non-Expansion Enrollee)**

	OLS (1)	1st stage (2)	IV 2nd stage (3)	OLS (4)	1st stage (5)	IV 2nd stage (6)
Ln(price of benefits)	-0.463*** (0.094)		-0.579*** (0.100)	-0.241** (0.109)		-0.494*** (0.166)
Expansion state* after expansion		-0.266*** (0.022)			-0.296*** (0.028)	
Share dual enrollees	3.524*** (0.486)	-0.196 (0.338)	3.635*** (0.432)	3.403*** (0.689)	-0.307 (0.493)	3.685*** (0.611)
Share child enrollees	0.095 (0.222)	0.399*** (0.140)	0.204 (0.213)	-0.334 (0.511)	0.388* (0.216)	-0.021 (0.522)
Sample		All States		States w/o not-newly-eligibles and w/o ABP		
N states		51		28		
N		401		219		

Notes: Models (2) and (4) have dependent variable = ln(price of benefits); all other models have dependent variable = ln(spending per non-expansion enrollee).

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Data Sources:

Kaiser Family Foundation

KFF Expansion Data

Description: Provides status of Medicaid expansion decisions by state, including expansion dates.

Purpose: Used for “expand” variable in “medicaid_state_year_panel_10_18.dta”

KFF Medicaid-CHIP Child Enrollment

Description: Medicaid/CHIP child enrollment data at state-month level from 2014 to 2018.

Purpose: Used to construct “chienr” variable in “medicaid_state_year_panel_10_18.dta”

From: <https://www.kff.org/medicaid/state-indicator/total-medicaid-and-chip-child-enrollment/>

KFF Federal Medical Assistance Percentage (FMAP) for Medicaid

Description: Provides FMAP at state-year level for FYs 2010 to 2018

Purpose: Used for “fmap” and “fmap_nnw” variables in “medicaid_state_year_panel_10_18.dta”

From: <https://www.kff.org/medicaid/state-indicator/federal-matching-rate-and-multiplier/>

KFF Medicaid MCO Enrollment

Description: Provides number of comprehensive risk-based managed care enrollees at the state-year level (calculated as of July 1 of each year).

Purpose: Used for “mco_pct” variable in “medicaid_state_year_panel_10_18.dta”

From: <https://www.kff.org/other/state-indicator/total-medicaid-mco-enrollment/>

Medicaid.gov

Medicaid Enrollment Data for 2015 – 2018

Description: Provides Medicaid total enrollment, expansion enrollment (broken into newly eligible and not newly eligible enrollment) at the state-month level from 2015 to 2018.

Purpose: Used for “totenr”, “newenr”, “nnwenr” variables in “medicaid_state_year_panel_10_18.dta”

From: <https://data.medicaid.gov/Enrollment/Medicaid-Enrollment-New-Adult-Group/pftr-tr7q>

Medicaid Expenditure Data for 2015 – 2018

Description: Provides Medicaid total spending, spending for expansion enrollees (broken into newly eligible and not newly eligible enrollees) at the state-quarter level from 2015 to 2018.

Purpose: Used for “totspd”, “newspd”, “nnwspd” variables in “medicaid_state_year_panel_10_18.dta”

From: <https://data.medicaid.gov/Uncategorized/Medicaid-CMS-64-New-Adult-Group-Expenditures/5im3-vamn/data>

Medicaid Number of Children Ever Enrolled Reports 2015–2018

Description: Provides number of children ever enrolled in Medicaid and Medicaid/CHIP at the state-year level from FYs 2015 to 2018.

Purpose: Used to construct “chienr” variable in “medicaid_state_year_panel_10_18.dta”

From: <https://www.medicaid.gov/chip/reports-evaluations/index.html>

MACStats

MACStats: Medicaid Full-Year Equivalent Enrollment and Spending for FYs 2010 – 2013

Description: Tables and exhibits from MACStats publications. Provides Medicaid enrollment and spending figures at the state-year level for FYs 2010 to 2013.

Notes: The FY2010 and 2011 data does not directly provide full-year equivalent (FYE) enrollment. Therefore, we calculate the FYE enrollment by using the total spending across all enrollees and the spending per FYE enrollee (both of which are reported). For FY 2012 and 2013, MACStats reports the FYE enrollment directly.

Purpose: Used for "totenr", "aduenr", "chienr", "totspd", "aduspd", "chispd" variables in "medicaid_state_year_panel_10_18.dta"

From: MACStats publications listed below

- June 2013 Table 13 for FY 2010 Total/Adult/Child Spending (total)
- June 2013 Table 14 for FY 2010 Total/Adult/Child Spending (per FYE enrollee)
- June 2014 Table 12 for FY 2011 Total/Adult/Child Spending (total)
- June 2014 Table 13 for FY 2011 Total/Adult/Child Spending (per FYE enrollee)
- December 2015 Exhibit 15 for FY 2012 Total/Adult/Child Enrollment (FYE)
- December 2015 Exhibit 22 for FY 2012 Total/Adult/Child Spending (per FYE enrollee)
- December 2018 Exhibit 15a for FY 2013 Total/Adult/Child FYE Enrollment (FYE)
- December 2018 Exhibit 22a for FY 2013 Total/Adult/Child Spending (per FYE enrollee)

MACStats: Comprehensive Managed Care Enrollment Percentages

Description: Tables and exhibits from MACStats publications. Provides Medicaid comprehensive managed care organization (MCO) enrollment percentages at the state-year level.

Notes: MCO enrollment percentage available for 2010 to 2016, except 2012. Adult and child MCO enrollment percentages available only for 2010 to 2013.

Purpose: Used for "mco_pct", "adu_mco_pct", and "chi_mco_pct" variables in "medicaid_state_year_panel_10_18.dta"

From: MACStats publications listed below

- December 2018 Exhibit 29 for 2016 MCO enrollment %
- December 2017 Exhibit 29 for 2015 MCO enrollment %
- December 2016 Exhibit 28 for 2014 MCO enrollment % (saved but never used)
- December 2015 Exhibit 28 for 2013 MCO enrollment %
- June 2013 Table 15 for 2011 MCO enrollment %
- June 2012 Table 9 for 2010 MCO enrollment %
- December 2018 Exhibit 30a for 2013 Adult/Child MCO enrollment %
- December 2015 Exhibit 29 for 2012 Adult/Child MCO enrollment %
- June 2014 Table 14 for 2011 Adult/Child MCO enrollment %
- June 2013 Table 17 for 2010 Adult/Child MCO enrollment %

Bureau of Labor Statistics (BLS)

BLS Unemployment Rate

Description: Unemployment rates at the state-month level from FYs 2010 to 2018.

Purpose: Used for "unemp_rate" variable in "medicaid_state_year_panel_10_18.dta"

Files: unemployment_rate_state.xlsx

From: BLS website. Downloaded data query "SeriesReport-20201203174913_de4bb6.xlsx"

BLS CPI-U

Description: BLS's Consumer Price Index for All Urban Consumers (CPI-U) at the state-year level from 1913 to 2019. (state-month also available, which could be used to change from calendar year avg to FY averages)

Purpose: Used for "cpi" variable in "medicaid_state_year_panel_10_18.dta"

Census Bureau

Census: Number of Poor and Poverty Rate by State

Description: Poverty rate at the state-year level (estimated for March of each year)

Purpose: Used for "pov_rate" variable in "medicaid_state_year_panel_10_18.dta"

From: Table 21 <https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-people.html>

Census: State Population

Description: Population at the state-year level (estimated for July 1 of each year) from 2010 to 2019.

Purpose: Used for "pop" variable in "medicaid_state_year_panel_10_18.dta"

From: <https://www.census.gov/data/tables/time-series/demo/popest/2010s-state-total.html>

Other

Medicaid-Medicare Dual Enrollment FYs 2010 – 2018

Description: Provides data on Medicaid-Medicare dual enrollment at the state-year level from 2010 to 2018.

Purpose: Used for "dualenr" variable in "medicaid_state_year_panel_10_18.dta"

Area Health Resources File (AHRF)

Description: AHRF from HRSA include data on various health care related variables, as well as geographic variables

Purpose: Used for "st_gen_hosp_beds", "md_tot_ptn_care_non_fed", "md_pc_ptn_care" variables in "medicaid_state_year_panel_10_18.dta"

From: Originally downloaded from <https://data.hrsa.gov/data/download>

2019 AAMC State Physician Workforce Data Report

Description: Published report includes data on physician workforce.

Purpose: Used for 2018 "md_tot_ptn_care_non_fed" and "md_pc_ptn_care" variables in "medicaid_state_year_panel_10_18.dta"

Variables:

Medicaid State-Year Panel: "medicaid_state_year_panel_10_18.dta"

- state – State name
- state_cd – FIPS state code
- state_abbr – Two-letter state abbreviation
- year – Fiscal Year (starts in Oct of previous year, e.g., Nov 2016 is in FY2017). Fiscal year always used unless only calendar year annual averages were available.
- expand – State with Medicaid expansion before Jan. 1 of that year

- totenr – Total Medicaid enrollment (Full year equivalent)
  - o FYE enrollment for FYs 2010 and 2011 calculated using by using total spending and total spending per FYE enrollee
  - o FYE enrollment for FYs 2012 and 2013 directly reported on MACStats
  - o FYE enrollment for FYs 2015–2018 constructed from monthly data from Medicaid.gov
- totspd – Total spending per FYE enrollee
  - o Spending per FYE enrollee directly reported on MACStats for FYs 2010–2013
  - o Spending per FYE enrollee constructed from quarterly total spending data and monthly enrollment data for FYs 2015–2018
- aduenr – Adult enrollment (FYE)
  - o Only available for FYs 2010–2013 from MACStats
- aduspd – Adult spending per FYE enrollee
  - o Only available for FYs 2010–2013 from MACStats
- adu_mco_pct – Comprehensive managed care adult enrollment %
  - o Only available for FYs 2010–2013 from MACStats. Calculated as of July 1 of each year.
- chienr – Child enrollment excluding CHIP (FYE)
  - o Available directly from MACStats for FYs 2010–2013
  - o Estimated for FYs 2015–2018 using data from KFF and Medicaid.gov by calculating the following:
    - $$[\text{avg number of Medicaid PLUS CHIP enrollees in state } s, \text{ year } y] * \frac{[\text{number of children ever enrolled in Medicaid}]}{[\text{number of children ever enrolled in Medicaid PLUS CHIP}]}$$
- chi_mco_pct – Comprehensive managed care child enrollment %
  - o Only available for FYs 2010–2013 from MACStats. Calculated as of July 1 of each year.
- dualenr – Medicare-Medicaid Dual enrollment
  - o Snapshot from December. Data from December of each year used for corresponding fiscal year. (e.g., Dec 2016 data used for FY 2017)
- newenr – Newly eligible enrollment (FYE). From Medicaid.gov
- newspd – Newly eligible spending per FYE enrollee. From Medicaid.gov
- nnwenr – Not newly eligible enrollment (FYE). From Medicaid.gov
- nnwspd – Not newly eligible spending per FYE enrollee. From Medicaid.gov
- st_gen_hosp_beds – Short-term General Hospital Beds. From AHRF.
- md_tot_ptn_care_non_fed – MDs: total patient care non-fed
  - o From AHRF and AAMC report. Missing years linearly interpolated.
- md_pc_ptn_care – MDs: primary care patient care
  - o From AHRF and AAMC report. Missing years linearly interpolated.
- cpi – National CPI-U Annual Avg (calendar year average). From BLS.
- pop – State population. From Census Bureau.
  - o Calculated as of July 1 of each year
- unemp_rate – Unemployment rate (%). From BLS.
- pov_rate – Poverty rate (%). From Census Bureau.
  - o Estimated for March of each year
- fmap – Federal Matching Assistance Percentage (FMAP). From KFF.
- fmap_nnw – FMAP for not newly eligible.

- Calculated as $FMAP + [(enhanced\ FMAP - FMAP) * transition\ %]$
  - Where Enhanced FMAP is 100%, 100%, 95%, 94% for 2015–2018, and transition % is 60%, 70%, 80%, 90% for 2015–2018
- mco_pct – Comprehensive managed care enrollment %.
  - Calculated as of July 1 of each year.
  - Data for FYs 2010–2016, except 2012, obtained from MACStats
  - Data for FYs 2017 and 2018 obtained from KFF