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INFORMATION, SPILLOVERS, OR HASSLE COSTS?  
EFFECTS OF MEDICAID PRIOR AUTHORIZATION ON  
PRESCHOOL ANTIPSYCHOTIC PRESCRIBING

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Information, Spillovers, or Hassle Costs? Effects of Medicaid Prior Authorization on Preschool  
Antipsychotic Prescribing  
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### **ABSTRACT**

We examine information versus hassle costs in the context of Medicaid prior authorization requirements for preschool antipsychotic prescribing. Such prescribing increased in the 1990s, despite substantial side effects and the absence of FDA approval. State Medicaid programs began to require prior authorization for antipsychotic prescribing to young children after 2005. We evaluate these policies using hand-collected policy data and national prescription data for 2006-2019. We find that prior authorization reduced prescriptions to children under six by 22-30% in the two years after implementation. There were no effects on privately insured or older children, suggesting little role for information spillovers.

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## 1. Introduction

Doctors with similar patients frequently make radically different treatment choices, and these decisions can have important effects on health outcomes and health care costs.<sup>1</sup> Health care accounts for almost 20% of U.S. GDP, and much of that spending is thought to be wasteful or even harmful (Chandra and Skinner (2012), Cutler (2014)). The increasing costs of psychotropic drugs has particularly stretched government budgets, with a 22.3% increase in prescribing to Medicaid patients in states that expanded Medicaid since 2014 (Maclean et al., 2018). But at this point, we know much more about the existence of differences in treatment than about the reasons for them, or about how to curb inappropriate care.

One plausible hypothesis is that many doctors lack *information* about appropriate treatments. Given the speed of innovation and the complexity of modern medicine, it may be extremely difficult, especially for general practitioners, to stay abreast of the latest developments. In this case, the provision of new information, in a way that is salient, could have major impacts. Several recent studies of letter-writing interventions that aim to curb inappropriate provider behavior have shown mixed results, however (Ahomaki et al., 2020; Doctor et al., 2018; Sacarny et al., 2016; Sacarny et al., 2018).

Alternatively, a growing literature shows that doctors respond to *hassle costs*. For example, Alpert et al. (2024) examine the impact of the introduction of a prescription drug monitoring program on opioid prescribing by Emergency Department doctors in Kentucky. Using data on privately insured patients, they find that opioid prescribing falls both for patients who are taking opioids (consistent with doctors using the PDMP to check doctor shopping behavior), but also for opioid-naïve patients, which suggests that providers are deterred from prescribing opioids by hassle costs. Dunn et al. (2024) find that providers respond to Medicaid billing hurdles by refusing to see Medicaid patients, and that these hurdles have as great an effect on willingness to treat these patients as Medicaid payment rates.

We examine the relative importance of information and hassle costs in the context of antipsychotic prescribing to preschool children on Medicaid. Second generation (“atypical”) antipsychotics (SGAs) entered the U.S. market in the 1990s and were quickly adopted because they were thought to have milder side-effects than older antipsychotics. Antipsychotics are

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<sup>1</sup> See Currie, MacLeod, and Musen (forthcoming) for a review. In one prominent example, Badinski et al. (2023) show that roughly a third of regional differences in the healthcare utilization of elderly Americans is explained by differences in average physician treatment intensity.

necessary for managing psychotic disorders, but such disorders do not develop until late adolescence. Antipsychotic prescribing to young children for non-psychotic behavioral disorders grew rapidly with the introduction of SGAs, though their superiority is increasingly unclear (Leucht et al., 2009). Although no atypical antipsychotic has ever been FDA approved for any diagnosis in children under five (Riddle, 2022), by 2008, 4.7 boys (1.7 girls) aged 2-5 per 1000 on Medicaid were taking antipsychotics. Children covered by Medicaid were four times more likely to be prescribed antipsychotics than children with private insurance (Crystal et al., 2009).

We take advantage of state Medicaid pre-authorization programs for antipsychotic prescribing to preschool children that were rolled out beginning in 2005. Staggered difference-in-difference models show that antipsychotic prescribing to 3-5-year-old children on Medicaid declined by 30 percent at the provider level and by 20 percent at the state level. The comparison between provider-level and state-level estimates provides a way to gauge the extent of doctor shopping, since if some individual doctors reduced prescribing, but patients were able to get prescriptions elsewhere, one would expect state-level estimates of treatment effects to be considerably smaller in magnitude than provider-level estimates.

The mechanisms driving these declines can be disentangled by comparing changes in the same provider's prescribing of antipsychotic prescribing to Medicaid-covered children and to privately insured children. If preauthorization requirements convey information about appropriate use, then one would expect a provider to reduce prescriptions to both publicly and privately insured children. However, within-provider estimates show that preauthorization requirements had no spillovers onto privately insured children and only affect Medicaid-covered children. This finding suggests that it is the hassle costs associated with prescribing to Medicaid children that drive the estimated effects.

Psychiatrists are expected to have better information than non-psychiatrists about the appropriateness of prescribing antipsychotics to young children. Hence, one might expect non-psychiatrists to be more affected by any information conveyed by preauthorization requirements. However, we would still expect new information to have similar effects on prescribing to the privately and publicly insured. Alternatively, non-psychiatrists may face higher hassle costs of dealing with preauthorization, especially if antipsychotic prescription is only a small part of their practice so that they do not develop skill in dealing with preauthorization. We find that non-

psychiatrists are more likely to significantly reduce antipsychotic prescribing, but only to Medicaid children, consistent with the idea that they face higher hassle costs.

Finally, we ask whether doctors facing additional hassle costs reduce prescribing in a way that prioritizes patient welfare. Arguably the children being prescribed these medications have severe mental health issues that the doctor believes merit prescription of antipsychotics. In this case doctors who found it more difficult to access antipsychotics for their patients might switch to antidepressants or benzodiazepines, which can have similar sedating effects on young children and were not subject to the same pre-authorization requirements. However, we find no evidence of such substitution. Second, doctors might prescribe antipsychotics even when they know that psychosocial interventions are preferred, because of a shortage of therapists and other non-prescribing mental health providers. But preauthorization requirements reduce antipsychotic prescribing even in areas that are relatively well supplied with these professionals.

Most economic studies of prior authorization requirements have focused on policies designed to reduce health care costs rather than policies designed to curb inappropriate prescribing. For example, Lavetti and Simon (2018) show how formulary design in Medicare Advantage enables plans to attract healthier, lower-cost enrollees, while Brot et al. (2025) examine Medicare Part D prior authorization policies, quantifying shifts in drug utilization and attendant financial savings. Their findings suggest that cost-focused prior authorization policies generate net savings, as reductions in drug spending substantially outweigh increases in administrative costs.<sup>2</sup>

The study that is most closely related to ours is that of Dillender (2018), who examines prior authorization requirements in the Workman's Compensation program in Texas focusing both on spending and drug safety. He finds that prior authorization lowered spending on non-preferred drugs and reduced high-risk prescription combinations. However, he finds little evidence of disproportionate effects on the most dangerous prescribing, which suggests that the requirements convey little new information about safety.

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<sup>2</sup> Brot-Goldberg et al. (2025) briefly discuss Medicare prior authorization rules aimed at patient safety, which mostly apply to generics and scheduled drugs, and include restrictions on antipsychotics. They find that prior authorization has smaller effects on utilization and cost for these drugs than for other drugs. We are also aware of work in progress by Burn and Ristovska (2023), who look at providers in MassHealth who were required to seek preauthorization for some medications but not for others within the same drug class. Their preliminary findings suggest that providers responded and that guideline-consistent usage was reduced more than inappropriate usage.

We are not aware of any previous study examining the effects of prior authorization requirements designed to protect young children, a group that might be expected to inspire altruism in providers to overcome hassle costs. We also contribute to the literature on prior authorization by being the first to use data from multiple states about a policy clearly intended to curb inappropriate and possibly harmful prescribing. Moreover, we put the spotlight on the motivations and mechanisms underlying provider behavior by asking how the same provider treats different groups of patients when some are subject to prior authorization and some are not. Since information about safety applies to all patients, if prior authorization requirements work by conveying important safety information to providers, then they should have similar effects on both the publicly and privately insured. The fact that prescribing falls only for publicly insured children suggests that information cannot be the main driver of physician's behavior.

One reason for the paucity of studies focusing on prior authorization requirements for young children is that it is difficult to find information about the patchwork of policies that apply. An additional contribution of our study is the correction of errors in previously published timelines of pediatric antipsychotic prior authorization policies, and the introduction of a new public-use database of primary source documents taken directly from state Medicaid programs and spanning two decades.<sup>3</sup> Establishing accurate and traceable policy timelines is necessary for rigorous research, as inaccurate policy data can lead to erroneous conclusions (Anderson and Rees, 2014; Horwitz et al., 2021).

The rest of the paper proceeds as follows: Section II discusses background about antipsychotics and preauthorization requirements. Section III provides an overview of the data. Section IV provides a conceptual framework and model predictions. Section V describes empirical methods. Section VI presents the estimates. Section VII concludes.

## **2. Background**

Antipsychotics are sedating and can rapidly reduce disruptive behavior in children with behavioral conditions. But these drugs have substantial metabolic side effects, and it can be difficult for patients to stop taking antipsychotics after treatment is initiated. Although it is recommended that children receive psychosocial services prior to starting antipsychotics, over 60% of Medicaid children 0-5 who take antipsychotics receive no such services (Finnerty et al.,

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<sup>3</sup> This database is available at OpenICPSR at <https://doi.org/10.3886/E238714V1>.

2016). One reason for the heavy reliance on prescription drugs for the management of behavioral health conditions is that they are often less expensive and more accessible than psychosocial services. However, the new antipsychotics were expensive, and spending on antipsychotics for children on Medicaid increased by nearly 600% between 1996 and 2005 (Fullerton et al., 2012). In 2005, Medicaid spent \$1.6 billion on psychotropic medications for children and adolescents, with \$684 million (43%) of that total for antipsychotics (Pires et al., 2013). Not surprisingly, state Medicaid programs became increasingly concerned about the burden of antipsychotic prescriptions on state budgets.

Beginning in 2005, state Medicaid programs began implementing more restrictive prior authorization requirements for the prescribing of antipsychotics to children, especially children under the age of six. Some states implemented comprehensive pediatric prior authorization policies targeting older age ranges, but the policies targeting children less than five or six were by far the most common. One reason for the focus on these young children was that atypical antipsychotics were not approved by the Food and Drug Administration for use in children less than five.<sup>4</sup>

Although all states have federal mandates to curb inappropriate use of prescription drugs for patients on Medicaid, state policies and programs are exceedingly decentralized and unstandardized. Since 1993, each state Medicaid program has been required to have a Drug Utilization Review (DUR) program charged with reducing inappropriate use of prescription drugs. These programs may be managed by a DUR board, a Pharmacy and Therapeutics committee, or both. The function and authority of these committees varies greatly state to state and over time. Some have the authority to institute new drug coverage policies, whereas others only make recommendations to state Medicaid program directors. Many states have implemented Preferred Drug Lists as part of their Drug Utilization Review program. Some lists explicitly state all prior authorization requirements, but other states communicate requirements to providers through various means including notices, provider handbooks, and drug criteria and limits lists. States may also use Pharmacy Benefits Managers to administer their preferred drug

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<sup>4</sup> Exactly one drug, risperidone, is approved for five-year-old children who have been diagnosed with irritability associated with autism.

lists. This variation in state policy complicates tracking prior authorization policies.<sup>5</sup> Hence, a major contribution of our study is to assemble a comprehensive data set of prior authorization requirements over a fifteen-year framework, as discussed below.

### **3. Data**

#### **a. Policy Data**

Data about relevant policies were hand collected for each state and year from 2005-2020, from state Medicaid program documents. These documents, numbering over 10,000 pages in total, include prescription drug lists, minutes from Drug Utilization Board and Pharmacy and Therapeutics Committee board meetings, memos and letters sent to providers, and provider handbooks and handouts. Some states make these historical documents readily available on their websites, but most documents were collected via the Wayback Machine or Freedom of Information Act or Public Record Act requests. This approach allowed us to either locate the exact implementation date of the first pediatric antipsychotic prior authorization policy or to confirm that no such policy was in place prior to 2019 for 46 out of 50 states. The four states that we were unable to find definitive information about are: Delaware, Nebraska, New Jersey, and Hawaii. Further details about the policy data collecting process are included in the Supplemental Appendix.

#### **b. Prescription and Provider Data**

Prescription data come from the IQVIA LRx database of antipsychotic (2006–2019), antidepressant (2006–2018), and anti-anxiety (2006–2018) prescriptions filled in retail pharmacies and by mail order. IQVIA (formerly known as IMSQuintiles) is a publicly traded company specializing in pharmaceutical market intelligence. As of 2025, IQVIA directly surveyed over 90% of retail pharmacies, with the remaining data imputed to sum to total area-level shipments. These data include unique provider IDs, provider specialty, anonymized patient IDs and the patient's 3-digit ZIP code, year of birth, and insurance status.

Additional analyses consider local heterogeneity in the availability of mental health services, using the May 2008 extract of the National Plan and Provider Enumeration System

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<sup>5</sup> Although most children covered by Medicaid today are covered by managed care organization, state Medicaid programs still maintain a relatively high degree of control over psychotropic drug policies that cover all Medicaid enrollees. See the Supplemental Appendix for further details.

(NPPES). NPPES includes a record for all health care providers with a National Provider Identifier (NPI). We use the May 2008 extract since all providers were required to have an NPI by May 2008. The number of providers in a ZIP code is scaled by population estimates provided in Kearney et al. (2021).

c. Sample Selection: States and Individual Providers

Prior authorization of some drugs within a class has long been common practice within state Medicaid programs, but these sorts of restrictions allow providers to prescribe similar drugs without prior authorization. We focus on comprehensive pediatric prior authorization policies, which restrict the prescribing of *all* formulations of atypical antipsychotics for children under a specified age. The analysis is restricted to providers in states that either never implemented a comprehensive pediatric prior authorization policy (control states) or in states that implemented a comprehensive pediatric prior authorization policy targeting children less than five or less than six years old (treatment states). The main analysis excludes states that implemented prior authorization requirements for all children less than 18, or that only required pre-authorization for children less than three, since these are arguably somewhat different policies. States that implemented more stringent pediatric prior authorization policies within two years of the initial focal policy are also excluded to allow for cleaner estimation of treatment effects.<sup>6</sup> These restrictions leave us with a final sample of 31 states: 20 ever-treated and 11 never-treated.

For individual providers, we follow Curie, Li, and Schnell's (2024) location assignment algorithm based on patient location to identify the practice location in each quarter.<sup>7</sup> The sample is restricted to providers whose patients under the age of 10 collectively filled at least 20 prescriptions for antipsychotics from 2006–2019, and who are either always observed practicing in either a control state or a treatment state, and providers who are first observed practicing in a treatment state, even if they subsequently move elsewhere. Providers are considered treated by the policy in the first quarter they are seen to be practicing in a treatment state, and treatment does not turn off when providers move, which reduces potential bias due to providers moving in response to prior authorization restrictions. These sample restrictions yield a sample of 12,508

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<sup>6</sup> Maryland, for example, implemented a comprehensive pediatric prior authorization policy targeting children less than five in 2011, but then expanded this policy to include all children less than 10 less than a year later.

<sup>7</sup> We augment the algorithm to impute the location of low-volume providers for quarters in which no prescriptions were filled by their patients. Details of these imputations are in the Supplemental Appendix.

providers in 31 states. The total number of prescriptions written by these 12,508 providers constitute 84% of the total prescriptions written to children aged 3 to 5 on Medicaid in our 31-state sample suggesting that most of the providers excluded wrote few prescriptions. Further details about these restrictions are in the Supplemental Appendix.

#### 4. Conceptual Framework

Prior authorization requirements can be expected to reduce prescribing through the information they impart to providers, through increased hassle costs that providers want to avoid, or through a combination of both mechanisms. Each of these mechanisms generate unique predictions about provider behavior.

Consider the basic model of physician behavior outlined in Currie, MacLeod, and Musen (2025). A child  $i_{Medicaid} \in N$  on Medicaid is brought to provider  $j \in J$  for psychiatric treatment. The provider chooses between a non-intensive treatment or more intensive treatment, denoted by  $t \in \{NI, I\}$ . In this context, the more intensive treatment is to prescribe antipsychotic medications, which have significant side effects but work quickly. The less intensive treatment is to refer to psychosocial services. There is an optimal choice for the child given by their unobserved state  $\alpha_i \in \{0, 1\}$ . When  $\alpha_i=0$ , psychosocial services are more appropriate and when  $\alpha_i=1$  antipsychotics are more appropriate.

Providers cannot perfectly observe the child's type, but they observe a noisy signal:

$$T_{ij} = \alpha_i + \epsilon/\gamma_j$$

where  $\epsilon \sim N(0,1)$  and  $\gamma_j$  is the diagnostic skill of the provider. The optimal decision rule for when to prescribe antipsychotics is thus:

$$t_{ij} = \begin{cases} I, & T_{ij} \geq \tau_j \\ NI, & T_{ij} < \tau_j \end{cases}$$

where the provider prescribes antipsychotics if and only if  $T_{ij} \geq \tau_j$ . The provider is assumed to choose the decision threshold between the intensive and non-intensive procedures so as to maximize utility, which depends positively on the expected medical benefit to her patient and depends negatively on the disutility from hassle costs.

The introduction of a pediatric prior authorization policy for antipsychotics can be thought of as affecting the threshold for prescribing,  $\tau_j$ , in several possible ways. First, a prior authorization requirement can provide new information about the likely medical benefit of

prescribing and/or the probability that a given patient is of the type that can benefit from intensive treatment. A provider being told that prior authorization is required for Medicaid patients under six may learn the pool of patients under six has fewer  $\alpha=1$  types than she previously believed and that prescribing more broadly is considered harmful rather than beneficial. This updated information should have spillovers to other patients, both those who are privately insured and not subject to the prior authorization requirement, and slightly older children, since the age discontinuity is clearly arbitrary from a biological perspective.<sup>8</sup> Thus, if prior authorization operates mainly through informational channels, one expects reductions in antipsychotic prescriptions to similar patients who are not directly targeted by the policy. The information pathway also predicts a smaller change in provider behavior for providers with higher diagnostic skill, but again, if changes are information-driven, they should be observed among both Medicaid patients and privately insured patients.

If prior authorization requirements affect providers behavior through the additional hassle costs of filling out the appropriate paperwork, the decision threshold  $T_{ij}$  is only updated for the specific group of patients for whom prior authorization is required, namely patients under the age of six on Medicaid. In this case, we expect no decrease in prescribing to children on private insurance or to children over the age of six. If anything, there may be an increase in prescribing to these patient populations unaffected patient populations if there is limited provider availability and providers prefer to treat patients for whom there are fewer hassle costs.

In contrast to the information mechanism, hassle costs should only affect Medicaid patients since they do not apply to the privately insured. Whether hassle costs have bigger or smaller effects on provider types with higher diagnostic skill is ambiguous. On the one hand, more highly trained providers may have a higher opportunity cost of time. On the other hand, they may have more familiarity with psychiatric prior authorization requirements and more supports (e.g. specialized staff) for dealing with them. Psychiatrists are also likely to be seeing sicker patients who may be more likely to benefit from off-label prescribing of antipsychotics.<sup>9</sup> However, since providers with higher diagnostic skill also see patients who have more severe

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<sup>8</sup> However, older children are more likely to be in school, which could raise the benefit to them of using antipsychotics to control their behavior. To the extent that this is an important factor in prescribing decisions, we might not see effects for slightly older children, even if there is an information spillover.

<sup>9</sup> Currie and Cuddy (Forthcoming) show that psychiatrists are more likely to prescribe off-label (i.e. in a way that is not approved by the U.S. Food and Drug Administration) than are other specialties.

underlying behavioral issues, the net effect of prior authorization on Medicaid patients by provider training is ambiguous.

## 5. Empirical Strategy

### d. Estimation: Provider-Level and State-Level Analysis

The treatment effects of prior authorization policies are estimated at both the state and the provider-level using the Callaway & Sant’Anna (2021) estimator<sup>10</sup> for staggered difference-in-differences in order to allow for treatment effect heterogeneity. The primary outcome of interest is the number of prescriptions per 1,000 children per quarter in state-level analysis or the number of prescriptions per provider-quarter in the provider-level analysis. Letting  $e$  be event time and  $e=t-g$  be the number of quarters since prior authorization began, the balanced average treatment effect over the first eight quarters after treatment on each of these two prescribing measures,  $Y_t$ , is computed as follows:

$$(1) \theta_{es}^{0,bal}(8) = \frac{1}{8+1} \sum_{e=0}^8 \sum_{g \in \mathcal{G}} \mathbf{1}\{g+8 \leq T\} ATT(g, g+e) P(G=g \mid G+8 \leq T)$$

where, for quarter  $t$  and units first treated in quarter  $g$ , the average treatment on the treated (ATT) is:

$$(2) ATT(g, t) = \mathbb{E}[Y_t - Y_{g-1} \mid G_g = 1] - \mathbb{E}[Y_t - Y_{g-1} \mid D_t = 0, G_g = 0],$$

and  $D_t = 0$  if the unit is untreated,  $G_g$  is an indicator for the first quarter that a unit is treated ( $G = \infty$  for controls),  $\mathcal{G} = \text{supp}(G) \setminus \infty$ .

State-level analyses are weighted by size of the relevant population. The population of children on Medicaid in each state is proxied using the number of children with family incomes less than 200 percent of the federal poverty level. Standard errors are clustered by state to allow for correlations between errors that are caused by state-level factors. Typically, new prior authorization policies are implemented shortly after they are announced, limiting the scope for anticipation in our setting, so we include not-yet-treated states as controls in the estimation.

### e. Estimation: Investigating Access to Care

To try to understand if local variation in access to providers mediates the effects of prior authorization, the primary analyses at the state and provider level are augmented with additional estimates aggregated to the 3-digit ZIP code level which include measures of access to mental

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<sup>10</sup> The Stata package `csdid` implements this method.

health practitioners who prescribe antipsychotics, and those who provide only non-pharmacological treatments. Areas with many providers who can prescribe antipsychotics may be less affected by prior authorization if there is competition among providers for patients (Currie et al., 2025). Areas with few behavioral therapists and other providers of psychosocial services may also be less affected by prior authorization if prescribers are concerned about patient welfare in the absence of alternative treatment. We use 3-digit ZIP codes because this is the smallest definition of a local area available in the data.

Practitioners can be divided into those who can prescribe (family medicine doctors, internal medicine doctors, psychiatrists, neurologists, physician assistants, nurse practitioners, and general practice doctors) and those who cannot (neuropsychologists, marriage and family therapists, psychologists, social workers, poetry therapists, psychoanalysts, and counselors). We then compare areas that are above and below the median in terms of prescribing and non-prescribing practitioners per capita.

One difficulty is that intracensal population estimates at the ZIP-code level—and particularly estimates for subgroups such as low-income children—are noisy. Hence, we use Poisson models as a denominator-agnostic way to analyze local prescribing. The large number of 3-digit ZIP code cells with zero counts, are addressed by using the estimator<sup>11</sup> proposed by Nagengast, Rios-Avila, and Yotov (2024), which builds on Wooldridge (2021), to estimate staggered difference-in-differences specifications incorporating Poisson pseudo-maximum likelihood estimation. These analyses do not use not-yet-treated units as controls as this method cannot be used to produce full event studies when not-yet-treated units are used in the comparison. Here, the baseline estimation equation is:

$$(3) Y_{it} = \exp\{\alpha + \sum_{g \in G} \sum_{t=t_0}^{g-1} \theta_{gt}^{pre} D_{igt} + \sum_{g \in G} \sum_{t=g}^T \theta_{gt}^{post} D_{igt} + \xi_i + \xi_t\}$$

where  $Y_{it}$  is the number of prescriptions in ZIP code  $i$  in quarter  $t$ ,  $G$  is the set of quarters in which treatment begins for ever-treated ZIP codes. A ZIP code starts treatment in quarter  $g$  in  $G$ .  $D_{igt}$  equals 1 if a ZIP code is in treatment group  $g$  in quarter  $t$ .  $\xi_g$  and  $\xi_t$  are 3-digit ZIP code and quarter fixed effects, respectively. Marginal treatment effects are reported for the first two years after prior authorization begins.

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<sup>11</sup> This method is implemented using the Stata package `jwddid`.

## 6. Estimates

### f. Provider-Level Estimates

Table 1 presents provider-level estimates. Panel A shows estimated effects on subsets of children aged 3-5 on Medicaid, while Panel B looks at spillovers onto privately insured children, older children, and also at whether there is substitution towards other drugs. The first column of Panel A shows that prescribers reduce prescribing to 3-5-year-old children on Medicaid by 30.3% relative to the 2006 baseline following the imposition of prior authorization requirements. Columns 2 through 5 look at the responses of different types of providers, defined using the provider's baseline distribution of antipsychotic prescribing.<sup>12</sup> These models show that providers who were initially below the median in prescribing antipsychotics to these children reduce prescribing by 28.5%. The size of the reduction increases monotonically with the baseline level of prescribing which suggests that prior authorization was effective in targeting high volume prescribers who may be at greater risk of inappropriate prescribing behavior.

Column 6 looks at new prescriptions (vs. refills). Because it can be difficult to stop taking antipsychotics due to withdrawal symptoms, one might expect to see larger effects in this subsample if physician decisions are motivated by concern about patients with established prescriptions. However, the estimated effect is very similar to that in Column 1, suggesting a 31.2% reduction in antipsychotic prescribing.

Column 7 examines the probability that a provider prescribes any antipsychotics at all to 3-5-year-old children on Medicaid. There is a 15.8% reduction, which suggests that while some providers stop prescribing antipsychotics to these children entirely, others cut back their prescribing.

Table 1 Panel B looks at the same categories and shows that there is no evidence of spillovers to older children on Medicaid or to privately insured children. There is also little evidence of substitution to other drugs,<sup>13</sup> though the point estimates are positive. These findings indicate that hassle costs rather than the informational content of the preauthorization requirements drive the reduction in prescribing.

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<sup>12</sup> The initial prescribing volume is defined using the number of prescriptions written by a provider in the first year including, and following, the first quarter that the provider has positive antipsychotic prescriptions to children ages 3–5 on Medicaid.

<sup>13</sup> Effects are similar when we restrict to selective serotonin reuptake inhibitors (SSRIs), which are the most prescribed antidepressants, or to trazodone, which like antipsychotics, is known to be quickly sedating.

Table 2 shows the effects of prior authorization policies by provider specialty. Panel A shows the estimated effects for 3–5-year-old children on Medicaid, while Panel B shows the equivalent estimates for the privately insured. Hence, we are able to see whether within specialty there is any spillover of the prior authorization requirements onto the privately insured. Table 2 shows significant reductions in prescribing to Medicaid patients by pediatricians, nurse practitioners, and family medicine doctors—three specialties that have less specialized training in the use of antipsychotics than psychiatrists have. There are no significant reductions in prescribing by child and adolescent psychiatrists, who have the most specialized training. Estimates for psychiatrists are negative but significant only at the 10% level of confidence. Hence, there is some evidence that prior authorization requirements have the most impact on providers who have less specialized training, consistent with a role for information.

However, cutting against this interpretation, Table 2 Panel B shows that there are no effects of prior authorization requirements on prescribing to privately insured children. These results suggest that information is not the mechanism, and the observed differences in effects on Medicaid prescribing may be driven by other differences in practice environment (such as the mental health status of the children seen, or the practice’s ability to process prior authorization requests).

g. State- and ZIP-Code-Level and Estimates

The aggregate effects of prior authorization on children on Medicaid could be muted if parents respond to these policies by seeking out providers who are more willing to prescribe antipsychotics even with prior authorization. State-level estimates, presented in Table 3, are broadly similar to provider-level estimates, suggesting a minimal role for such doctor shopping. Relative to mean prescribing levels in 2006, the number of antipsychotics prescribed to children on Medicaid between ages 3–5 per 1,000 children declined by approximately 20 percent in the first two years after a prior authorization requirements. The point estimate on the effect size at the state level is somewhat smaller than that from the provider-level estimates (a 20% decline at the state level versus 30% decline at the provider level), but we cannot rule out effects of the same magnitude across specifications.

The state-level estimates also show no evidence of spillovers to older children on Medicaid or to privately insured children, providing further evidence that prior authorization policies did not operate through primarily informational channels. Antidepressant and

benzodiazepine use among children ages 3–5 on Medicaid does not increase significantly either, indicating that substitution to other drugs does not occur via doctor shopping.

h. Estimates By Availability of Prescribing and Non-Prescribing Practitioners  
If competition for patients influences prescriber decision making, providers in areas with a higher number of prescribers per capita may be more willing to deal with hassle costs associated with prior authorization. If prescribers are concerned with patient well-being, then those in areas with lower numbers of non-prescribing mental health providers per capita (e.g., psychologists) may be less affected by prior authorization.

Table 4 shows that there is little evidence that the availability of either type of provider matters. The effects of prior authorization are of somewhat higher in low-access areas defined either in terms of prescribing or non-prescribing providers, but differences across areas are not statistically significant. The estimates range from a 36 percent to a 48 percent reduction in the total number of prescriptions at the 3-digit ZIP code level. These results suggest that hassle costs may dominate both competitive forces in the market for providers and provider altruism.

## 7. Discussion and Conclusions

We find that prior authorization policies targeting the youngest children clearly succeeded in reducing off-label prescribing. These declines account for a significant share of the dramatic reduction in prescribing to preschool-aged children observed over the last two decades. Within our 31-state sample, we find that antipsychotic prescribing to children on Medicaid ages 3–5 declined by 76% percent between 2006 and 2019, and prior authorization can explain 18% of this change.<sup>14</sup>

The similarity in effect sizes in state-level and provider-level analyses suggest that there was little potential for families to offset reductions in individual provider’s prescribing by doctor shopping. The lack of spillovers to privately insured children across all specialties suggests that hassle costs and not the informational content implicit in the prior authorization requirements drove the reductions in prescribing. In other words, providers prescribe less not because their

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<sup>14</sup> In 2006, the average quarterly prescribing to children ages 3–5 on Medicaid was 2.72 per 1,000 children ages 3–5 under 200% of the FPL. In 2019, the average quarterly prescribing to children ages 3–5 on Medicaid was 0.66 per 1,000 children ages 3–5 under 200% of the FPL. 20 out of 31 states in our primary sample implemented prior authorization policies with an average treatment effect of -0.585 per 1,000 children ages 3–5 under 200% of the FPL.  $-0.585 \times (20/31) / (0.66 - 2.72) = 0.183$ .

beliefs about appropriate use change, but because the administrative burdens of prescribing make doing so less attractive. These findings provide evidence that imposing barriers to the provision of inappropriate treatment may be more effective than the informational campaigns that have become increasingly popular in recent years.

Although the last two decades has seen a considerable drop in overprescribing of antipsychotics to children, concerns remain that too many children are still receiving these drugs off-label. The Substance Use Disorder Prevention that Promotes Opioid Recovery and Treatment for Patients and Communities (SUPPORT) Act—which was signed in 2018 with enormous bipartisan support—specifically directed state Medicaid programs to “monitor and manage the appropriate use of antipsychotics by children.” The design and implementation of such programs, however, was fully left to the states. The prior authorization requirements targeting children under the age of six that we study—most passed years before the SUPPORT Act—fulfilled this directive. For many states, the directive of the SUPPORT Act was thus less a call to action than a formal recognition of policies already in place.

Our results suggest that these state policies were effective in reducing prescribing to the targeted age group, but their impact was narrowly circumscribed. Because reductions occur only where authorization requirements bind, and do not spill over to older children or to privately insured patients, these policies operate by increasing the relative cost of prescribing rather than by shifting provider beliefs about appropriateness. This mechanism has two important implications. First, prior authorization can be a powerful tool for curbing utilization in well-defined high-risk populations. Second, its effectiveness does not extend beyond the targeted group, limiting its potential to generate broader improvements in prescribing practices. Thus, while the SUPPORT Act succeeded in codifying a set of policies that reduce inappropriate prescribing at the margin, its design leaves unaddressed the more general problem of off-label use among children not directly covered by prior authorization. There are FDA-approved indications for atypical antipsychotics in children over the age of six, but overprescribing to older children is still a pressing issue. The American Psychiatric Association recommends that antipsychotics only be considered as a first-line intervention for children with psychotic disorders, which rarely occur before adolescence.

An important limitation of our study is that we cannot observe the downstream outcomes of children who would have received antipsychotics in the absence of prior authorization. Many

children have benefited from avoiding these drugs with serious side effects; others may have faced continued behavioral challenges in the absence of adequate alternatives. Understanding these long-run outcomes—educational, behavioral, and health—should be a priority for future work.

The mechanisms highlighted here likely extend well beyond pediatric psychiatry. Administrative frictions shape decision-making in many areas of health care—from opioid prescribing and antibiotic stewardship to imaging utilization and specialty referrals. The challenge for policymakers is to strike a balance between constraining inappropriate behavior and preserving clinical flexibility. More broadly, the contrast between information and hassle costs illustrates two distinct channels through which regulation can influence behavior—by changing what agents know, or by changing what they find worth the effort to do. Distinguishing between these channels is essential for policy design: Interventions that operate through hassle costs are potent but transitory, while those that convey information may possibly yield more durable improvements in decision-making and social welfare.

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Figure 1: Effect on Rx to Patients Ages 3-5 at the Provider-Quarter Level

Figure 1A: Effect on Antipsychotics Rx to Medicaid Patients Ages 3-5 at the Provider Quarter Level

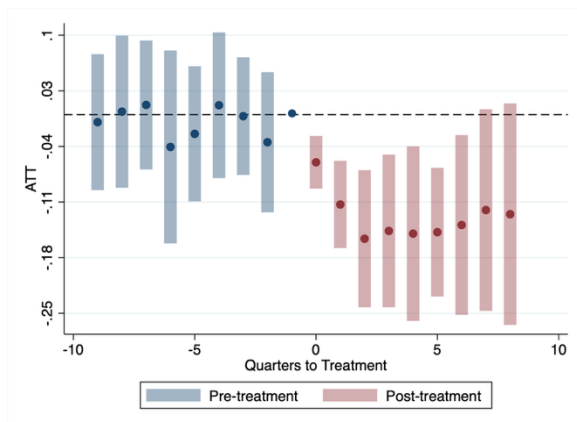


Figure 1B: Effect on Antipsychotics Rx to Private-Pay Patients Ages 3-5 at the Provider-Quarter Level

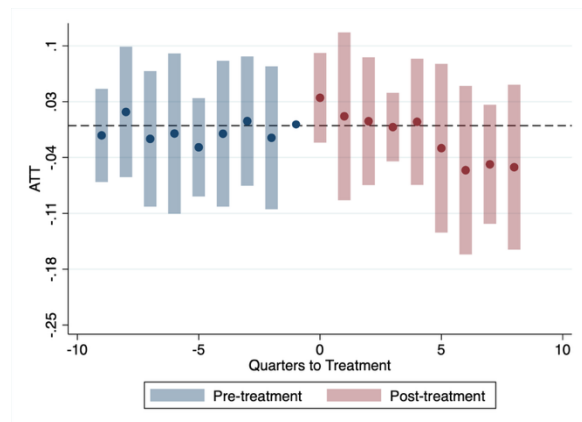


Figure 1C: Effect on Antidepressants Rx to Medicaid Patients Ages 3-5 at the Provider Quarter Level

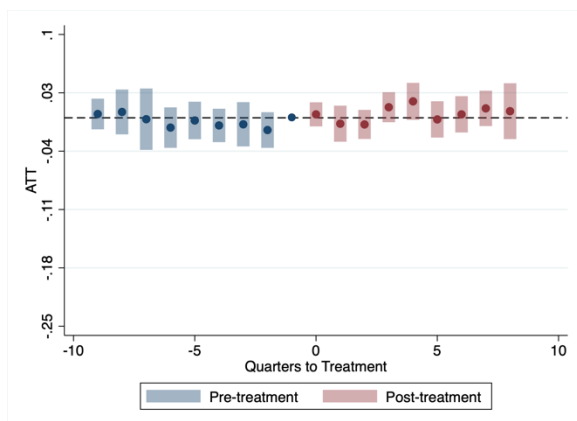
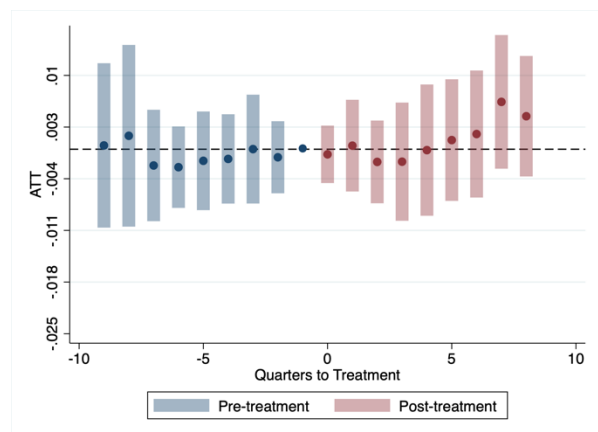


Figure 1D: Effect on Benzodiazepine Rx to Medicaid Patients Ages 3-5 at the Provider Quarter Level



**Table 1: Provider fixed effects estimates of effects of pre-authorization requirements on providers***Panel A: Effects on Antipsychotic prescribing to Medicaid patients aged 3-5*

|                            | (1)               | (2)                                          | (3)                                          | (4)                                       | (5)                                       | (6)                            | (7)               |
|----------------------------|-------------------|----------------------------------------------|----------------------------------------------|-------------------------------------------|-------------------------------------------|--------------------------------|-------------------|
|                            | All Rx            | Rx for<br>provider<br>>0 &<br>≤50th<br>ptile | Rx for<br>provider<br>>50th &<br><90th ptile | Rx for<br>provider<br>above 75th<br>ptile | Rx for<br>provider<br>above 90th<br>ptile | Rx for new<br>patients<br>only | Any Rx<br>(0/1)   |
| Preauthorization<br>effect | -0.129<br>(0.043) | -0.024<br>(0.029)                            | -0.205<br>(0.062)                            | -0.574<br>(0.159)                         | -0.832<br>(0.264)                         | -0.086<br>(0.031)              | -0.017<br>(0.007) |
| 2006 Mean                  | 0.425             | 0.083                                        | 0.439                                        | 0.0695                                    | 0.669                                     | 0.277                          | 0.108             |
| % Effect                   | -30.3             | -28.5                                        | -46.8                                        | -82.5                                     | -124.4                                    | -31.2                          | -15.8             |
| N providers                | 12508             | 3845                                         | 3797                                         | 1925                                      | 853                                       | 12508                          | 12508             |

*Panel B: Spillovers onto age 7-9 Medicaid patients or private patients; substitution of other drugs*

|                            | (8)              | (9)                    | (10)              | (11)               | (12)                              | (13)                   |
|----------------------------|------------------|------------------------|-------------------|--------------------|-----------------------------------|------------------------|
|                            | Medicaid<br>7-9  | New<br>Medicaid<br>7-9 | Private 3-5       | New<br>Private 3-5 | Medicaid<br>3-5 anti-<br>depress. | Medicaid<br>3-5 Benzo. |
| Preauthorization<br>effect | 0.048<br>(0.200) | 0.077<br>(0.127)       | -0.014<br>(0.036) | -0.005<br>(0.023)  | 0.005<br>(0.008)                  | 0.001<br>(0.003)       |
| 2006 Mean                  | 2.571            | 1.651                  | 0.362             | 0.233              | 0.167                             | 0.031                  |
| % Effect                   | 1.9              | 4.7                    | -3.9              | -2.1               | 3                                 | 3.2                    |
| N providers                | 12508            | 12508                  | 12508             | 12508              | 12508                             | 12508                  |

Notes: Table reports the average treatment on the treated effect over the first two years post treatment. Standard errors are clustered at the state level and appear in parentheses.

Analysis is at the provider quarter level. Sample is restricted to providers who wrote at least 20 antipsychotic prescriptions to children on Medicaid under the age of 10 from 2006-2019.

**Table 2: Provider fixed effects estimates of pre-authorization on scripts by provider specialty***Panel A: Effects on Antipsychotic prescribing to Medicaid patients aged 3-5*

|                         | (1)               | (2)               | (3)                             | (4)                | (5)               | (6)               |
|-------------------------|-------------------|-------------------|---------------------------------|--------------------|-------------------|-------------------|
|                         | Pediatrics        | Psychiatry        | Child and Adolescent Psychiatry | Nurse Practitioner | Family Medicine   | Other             |
| Preauthorization effect | -0.143<br>(0.057) | -0.173<br>(-.090) | -0.098<br>(0.062)               | -0.082<br>(0.026)  | -0.074<br>(0.022) | -0.124<br>(0.051) |
| 2006 Mean               | 1.611             | 0.637             | 0.627                           | 0.135              | 0.121             | 0.439             |
| % Effect                | -8.9              | -27.2             | -15.6                           | -60.9              | -61.1             | -28.3             |
| N providers             | 2680              | 2625              | 2223                            | 1922               | 1209              | 1849              |

*Panel B: Effects on Antipsychotic prescribing to privately insured patients aged 3-5*

|                         | (7)               | (8)              | (9)                             | (10)               | (11)             | (12)             |
|-------------------------|-------------------|------------------|---------------------------------|--------------------|------------------|------------------|
|                         | Pediatrics        | Psychiatry       | Child and Adolescent Psychiatry | Nurse Practitioner | Family Medicine  | Other            |
| Preauthorization effect | -0.033<br>(0.004) | 0.012<br>(0.055) | -0.074<br>(0.074)               | -0.52<br>(0.046)   | -0.37<br>(0.031) | 0.062<br>(0.044) |
| 2006 Mean               | 0.295             | 0.531            | 0.587                           | 0.1                | 0.045            | 0.426            |
| % Effect                | -11.1             | 2.2              | -12.6                           | -52.5              | -82.3            | 14.6             |
| N providers             | 2680              | 2625             | 2223                            | 1922               | 1209             | 1849             |

Notes: Table reports the average treatment on the treated effect over the first two years post treatment. Standard errors are clustered at the state level and appear in parentheses.

Analysis is at the provider quarter level. Sample is restricted to providers who wrote at least 20 antipsychotic prescriptions to children on Medicaid under the age of 10 from 2006-2019.

**Table 3: Effects of pre-authorization requirements on state-level prescribing measures**

|                            | (1)                                           | (2)               | (3)                  | (4)              | (5)                           | (6)                               |
|----------------------------|-----------------------------------------------|-------------------|----------------------|------------------|-------------------------------|-----------------------------------|
|                            | Prescriptions per 3-5/population 3-5 <200 FPL |                   |                      |                  | Rx per 3-5<br>pop>200<br>FPL  | Rx 7-9 per<br>pop 7-9<br><200 FPL |
|                            | All Rx                                        | New Rx            | Anti-<br>depressants | Benzos           | Rx 3-5/Pop.<br>3-<br>5>200FPL | Rx 3-5/Pop.<br>7-<br>9<200FPL     |
| Preauthorization<br>effect | -0.585<br>(0.249)                             | -0.393<br>(0.175) | 0.203<br>(0.299)     | 0.091<br>(0.087) | -0.074<br>(0.179)             | 0.464<br>(1.262)                  |
| 2006 Mean                  | 2.721                                         | 1.777             | 4.274                | 1.206            | 2.015                         | 17.882                            |
| % Effect                   | -21.5                                         | -22.1             | 4.8                  | 7.6              | -3.7                          | 2.6                               |
| N states                   | 31                                            | 31                | 31                   | 31               | 31                            | 31                                |

Notes: Table reports the average treatment on the treated effect over the first two years post treatment. Standard errors are clustered at the state level and appear in parentheses.

Analysis is at the quarter and state level. Population in 1000s.

**Table 4: Poisson Estimates of Effects Pre-authorization Requirements on 3-digit Zip Prescribing**  
**By area-level prescribing and non-prescribing mental health provider access**

|                            | (1)                                                             | (2)                                                                    | (3)                                                             | (4)                                                                    |
|----------------------------|-----------------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------------|
|                            | Below median<br>mental health<br>prescribing provider<br>access | Below median non-<br>prescribing<br>behavioral mental<br>health access | Above median<br>mental health<br>prescribing provider<br>access | Above median non-<br>prescribing<br>behavioral mental<br>health access |
| Type of zip code:          |                                                                 |                                                                        |                                                                 |                                                                        |
| Preauthorization<br>effect | -0.451<br>(0.119)                                               | -0.481<br>(0.123)                                                      | -0.387<br>(0.084)                                               | -0.355<br>(0.063)                                                      |
| Mean Providers/1K          |                                                                 |                                                                        |                                                                 |                                                                        |
| Population                 | 1.001                                                           | 0.461                                                                  | 4.497                                                           | 3.285                                                                  |
| 2006 Mean                  | 13.93                                                           | 14.64                                                                  | 12.37                                                           | 11.67                                                                  |
| N zip codes                | 259                                                             | 259                                                                    | 259                                                             | 259                                                                    |

Notes: Table reports the average treatment on the treated effect over the first two years post treatment.  
Standard errors are clustered at the state level and appear in parentheses.  
Analysis is at the quarter and 3-digit zip code level.

## Supplemental Appendix

### A. Collecting information about state Medicaid anti-psychotic prior authorization policies for children

Schmid and coauthors (2015) provide a snapshot of Medicaid prior authorization policies for pediatric use of antipsychotics, which provided a starting point. Schmid et al. (2015) collected information from contemporaneous Internet documents and email exchanges with Medicaid officials. Their snapshot of these policies is mostly accurate, but has some errors, most likely due to the ambiguity about the true start date of these policies. For example Colorado's Medicaid program required prior authorization of all new antipsychotics for children under the age of 5 starting April 1, 2010 but allowed children previously prescribed antipsychotics to be grandfathered until April 1, 2012.<sup>15</sup> Additional documentation was also required to describe policy changes that occurred after 2015 and to establish which states did not implement any policy during our sample period.

More than 10,000 pages of documents were hand collected, covering each state Medicaid program for each state and year from 2005-2020. These documents included prescription drug lists, minutes of Drug Utilization Review Board meetings, minutes of Pharmacy and Therapeutics Committee meetings, memos and letters to providers informing them of changes, provider handbooks, and handouts for providers. These documents are available at: <https://doi.org/10.3886/E238714V1>. The authority of each state's Drug Utilization Review Board and/or Pharmacy and Therapeutics Committee was investigated in order to establish policy dates, since states vary with respect to the direct authority of these institutions. These documents were further supplemented with historical newspaper articles and blogs where that was necessary to establish a date. Although some of these historical documents are available on state websites, most documents were collected via the Wayback Machine, Freedom of Information Act (FOIA) requests, or Public Record Act requests.<sup>16</sup> The cyberattack on Change Healthcare in February 2024 destroyed valuable data. Maine Medicaid, for example, had previously hosted a website with all archived PDLs via Change Healthcare. That website lost all its data in the attack and had not been fully restored as of September 2025.

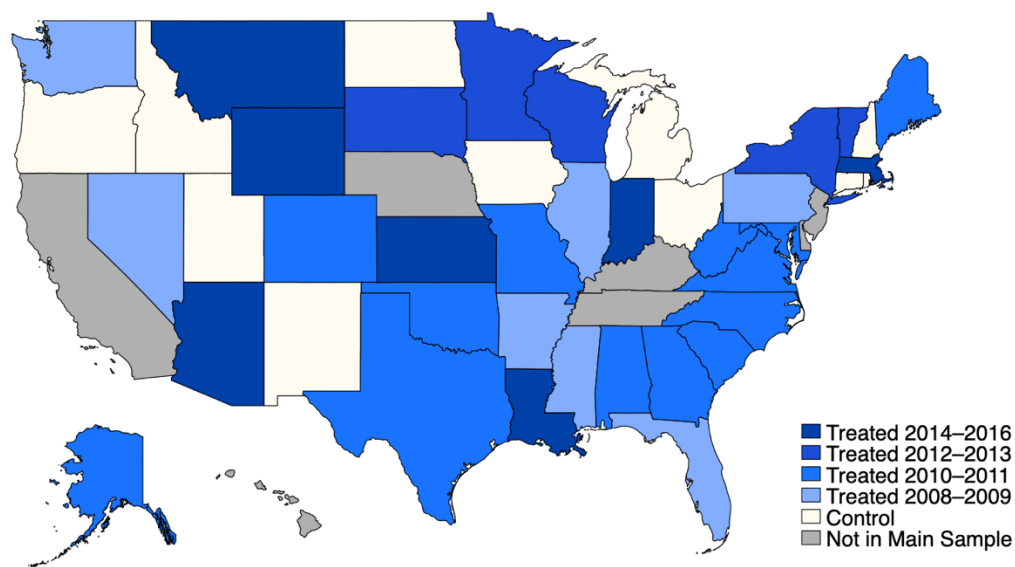
These documents allowed policy changes (and policy stability) to be tracked over time. When the exact date of a policy change was missing, a range could be established using the last document where the policy was not in place and the earliest document which confirmed that the policy was in effect. Then, using this new range of dates, the Wayback Machine and local newspapers were searched for additional information.

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<sup>15</sup> In this case, we used the Preferred Drug List from April 1, 2010 to clarify the details of this policy. The section on antipsychotics says the following: "*Clients currently stabilized on a non-preferred oral atypical antipsychotic can receive approval to continue on that agent for two years even if the client does not meet the age, dosing or FDA approved indication requirements. New Atypical Antipsychotic prescriptions for clients under 5 years of age will be reviewed on an individual basis by a clinical health care professional at the Department.*" Other source documents we collected from Colorado further support this timeline.

<sup>16</sup> Kate Musen gratefully acknowledges support from the Swarthmore Alumni Network, whose members filled FOIA requests in several states that have a residency requirement to file such requests.

This approach allowed us to either find the exact date of the first pediatric antipsychotic prior authorization policy or to confirm that no policy was in place prior to 2019 for 46 out of 50 states. The four states with ambiguous dates are: Delaware, Nebraska, New Jersey, and Hawaii. No documentation of a pediatric antipsychotic prior authorization policy was found for New Jersey or Hawaii, but it also proved impossible to collect enough documentation to be sure that no policy has ever been in effect. Delaware seems to have instituted a pediatric antipsychotic prior authorization policy relatively early, but the prescription drug lists from around the time that the Drug Utilization Review Board was discussing such policies do not outline all of the required clinical prior authorizations. Nebraska instituted a prior authorization policy sometime between September 2008, when their DUR recommended the policy, and the end of 2009 (the Lincoln Star Journal reported that the policy had been in place for approximately three years as of June 2012).



Some states have completely carved out pharmacy benefits from Medicaid managed care coverage, while other states have carved out high-cost or mental health drugs specifically. Other states have implemented uniform clinical protocols or prescription drug lists for some or all drugs that Medicaid managed care plans must follow. We do not track these changes over time, as this lies beyond the scope of our paper, but the Kaiser Family Foundation reported that as of 2019, 31 states had implemented uniform clinical protocols for at least one drug and 17 states had implemented uniform prescription drug lists for one or more drug classes. In other words, providers in Medicaid managed care plans were subject to the same prior authorization requirements as other Medicaid providers. We did not systematically collect Medicaid managed care-specific policies over time, so our results do not adjust for the few instances where managed care plans had complete control over prior authorization requirements and chose to implement them. Still, the policies as documented are likely to reflect the barriers faced by most providers treating children on Medicaid over time, because they applied to the majority of Medicaid providers and often extended to Medicaid managed care.<sup>17</sup>

<sup>17</sup> A few states did include Medicaid managed care formularies as part of their responses to our FOIA requests, and we do include these in the database of source documents for reference. To the extent that any Medicaid managed

## B. Construction of the provider sample

One difficult problem is knowing whether a provider who is observed to be practicing in a particular state at a point in time was practicing in the same state at the time of the policy change. Providers are assigned to states, using three assumptions. First, providers are assumed to have practiced in the same state as the first state we observe them in for all quarters before the first quarter without a missing state assignment. Second, providers are assumed to have continued to practice in the last state we observe them in for all quarters after the last quarter without a missing state assignment. Finally, for any spell of consecutive missing quarters for which the provider was observed to be practicing in the same state immediately prior to and immediately following the spell of missing quarters, we assume that the provider did not move states during the intermediate period. When a provider is seen in one location, and then after a few quarters of missing data, they are seen in another location, they must have moved states sometime in the intermediate period, but we do not know when they moved. Their location is treated as missing for the intermediate period and no further assumptions are made about when the move occurred.

After assigning providers to states, providers who did not write at least 20 prescriptions for patients under 10 between 2006 and 2019 were dropped, leaving 24,874 providers. All providers who were practicing in the first quarter of 2006 in either an always treated state or one of the four states (plus D.C.) for which we are missing complete policy information are also dropped. This step reduces the sample to 22,664 providers.

Next, providers who only practice in states that implemented comprehensive pediatric prior authorization policies targeting other age ranges (besides than less than five or less than six) are dropped. The reason for doing this is to be able to consider a uniform policy across the 31 states included in our sample. We also drop providers who practiced in one of these states before moving to a treated state. These restrictions reduce the sample to 15,639 providers. Next, providers who move to treated states only at the very end of the sample period and whom we do therefore not observe for two years post-treatment are dropped. This restriction reduces the sample only slightly to 15,593 providers. Next, providers who we know are eventually treated but whose first quarter of treatment is ambiguous either due to missing location information or first practicing in one of the states with missing policy information are dropped. In the final sample adjustment, providers who only practice in control or states with different types of treatment (i.e. different age ranges) are dropped. This leaves a final sample of 12,508 providers. However, these 12,508 providers issue 84% of the antipsychotic prescriptions to young children in our 31-state sample, suggesting that they are the relevant providers to focus on.

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care plans had differing policies, our estimates of the effects of prior authorization constitute a lower bound. Differing policies within managed care plans would bias in our estimates toward zero because our prescription data do not distinguish between children in managed care and children in FFS, so if children in managed care did not actually face prior authorization requirements, they would be incorrectly labeled as treated.