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Research paper

Is Mississippi's prescription-only precursor control law a prescription to decrease the production and raise the price of methamphetamine?☆

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ABSTRACT

Background: In 2010, Mississippi became the second state to require a prescription to purchase pseudoephedrine-based medications. Proponents of "prescription-only" laws argue that they are necessary to disrupt methamphetamine markets, but critics note the costs to legal consumers of cold medications may offset some of the laws' intended benefits.
Objective: We evaluated the effect of prescription-only restrictions for methamphetamine precursors on state-level methamphetamine lab seizures and methamphetamine prices.
Methods: We used a synthetic control approach to create a control state comparable to Mississippi and then used permutation testing to determine if the resulting difference was statistically significant.
Results: We found that Mississippi's prescription-only law removed 2637 small methamphetamine labs in the two years after the law became effective, which represents a 77% reduction in small labs relative to the synthetic counterfactual. We found no evidence that the law impacted methamphetamine prices.
Conclusion: We conclude that while prescription-only laws can reduce the number of domestic small methamphetamine labs in operation, methamphetamine availability is unlikely to be materially impacted.

Introduction

Methamphetamine (meth) use is a widespread problem with an estimated 595,000 users in 2013, up 69% from 2010 (though below the high in 2006) [SAMHSA] Substance Abuse and Mental Health Services Administration. The number of users has remained steady in the last few years ([US DEA] United States Drug Enforcement Administration, 2013). Its use disproportionately affects vulnerable populations (Chew Ng et al., 2012; Gonzales, Mooney, & Rawson, 2010; Kushel, Hahn, Evans, Bangsberg, & Moss, 2005) and is frequently associated with other risky behaviours (Shaw, Shah, Jolly, & Wylie, 2008).

Meth, and d-methamphetamine in particular, production depends on access to scarce inputs, such as pseudoephedrine and ephedrine. Traditionally drug policy has tended to intervene into meth output markets by disrupting domestic access to these inputs.

Due to domestic meth market rebounding after several major federal interventions in the 1990s, states throughout the early 21st century experimented with a variety of over-the-counter regulations to impede illegal use of pseudoephedrine (PSE) in the manufacturing of meth. In 2006, the federal Combat Methamphetamine Epidemic Act of 2005 (CMEA) went into effect and led to a large disruption in domestic meth markets (Cunningham & Finlay, 2015; Dobkin, Nicosia, & Weinberg, 2014). While initially followed by promising declines in meth synthesis in domestic labs, pseudoephedrine and ephedrine import restrictions in Mexico in 2008 and 2009 led to rebounds in domestic meth lab activity ([US NDIC] United States National Drug Intelligence Center, 2010). Domestic production and small lab activity has continued, despite restricted access to key precursor inputs following the CMEA. This is due, in part, to domestic meth producers ability to circumvent regulations by relying on organized pseudoephedrine purchasing rings, or "smurfing" ([US NDIC] United States National Drug Intelligence Center, 2010). Members of smurfing groups make multiple small purchases of precursors so that no single transaction exceeds the legal limit.

The steady increase in domestic meth activity has led to continual policy experimentation at the state level to control

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access to chemical precursors (Cunningham & Finlay, 2015; Dobkin et al., 2014). The two most commonly proposed regulatory policies at the state level are computerized databases listing all pseudoephedrine purchases across all retail distributors and laws requiring a doctor's prescription for dispensation.

Two states have enacted "prescription-only" laws for meth precursors: Oregon in 2005 and Mississippi in 2010. While most states classify meth precursors as Schedule V substances that can be obtained over the counter, Mississippi and Oregon have classified these drugs as Schedule III substances which require a prescription for purchase. Oregon's prescription-only law went into effect within four months of the CMEA, making separate identification of the impacts of the two policies difficult. Additionally, Cunningham et al. (2012) have shown lab seizures had decreased prior to the prescription requirement making sizable additional decreases infeasible. In February 2010, Mississippi enacted a prescription-only law that became effective in July 2010. As this policy was enacted several years after the federal CMEA and in a state where small lab production was relatively common it is suitable for a quasi-experimental analysis.

Previous work has analysed changes in trends in meth lab seizures in Mississippi coincident with the prescription requirement (Cunningham et al., 2012). In this paper we expand on this prior work by using a synthetic control method for data analysis. It is particularly suited for application to this comparative case study as it constructs a synthetic control group algorithmically, rather than relying on a pre–post comparison within Mississippi. Statistical inference is then performed with permutation testing on effects in the treatment series compared to control series.

Our second principal contribution is an examination of the impacts of prescription requirements for precursors on methamphetamine prices. As representative data on meth availability does not exist, prices can serve as a proxy for drug availability. Our previous work (Cunningham & Finlay, 2015) found demand for meth was inelastic, even in the face of dramatic price changes. A particularly effective 1995 federal restriction on ephedrine distribution caused methamphetamine prices to triple over their trend levels (Dobkin & Nicosia, 2009). Since demand for meth is relatively inelastic, a decrease in availability of the drug will be detectable in the price data.

In this paper we use a synthetic control approach to examine the impact of Mississippi's prescription-only regulation of meth precursors on meth lab seizures and meth prices.

Methods

Discussion of datasets

For ideal identification of the impact of the law on the number of meth labs, we would like to have counts of operating meth labs. As meth production is illegal, we instead used counts of meth lab seizures from the National Clandestine Laboratory Register (NCLR) maintained by the DEA's El Paso Intelligence Center (EPIC). We applied for and were granted access to the complete NCLR records for January 2000 to December 2012 using a Freedom of Information Act request. We started our analysis in 2007 to avoid any contaminating effects of the federal CMEA. These data were obtained at the incident level and contain detailed geographic information (including county and street address), lab capacity, seizure date, and lab type (anhydrous ammonia, tablet extraction, meth, etc.). We used lab type to limit our analysis to meth labs, and seizure date and location to aggregate data to the state by month cell for analysis. We restricted our analysis to labs with capacities under 2 oz, since we expected small labs to be most affected by this retail-level requirement for precursor purchase.

Fig. 1 plots raw counts of small meth lab seizures for Mississippi compared to the rest of the country. Nationwide, the number of small meth labs seized has risen since the post-CMEA trough of 2007, possibly as a response to the Mexican ban of pseudoephedrine importation ([US NDIC] United States National Drug Intelligence Center, 2010). Meth lab seizures in Mississippi rose contemporaneously with national trends until shortly before the law became effective on July 2010. This was followed by a sharp decline in Mississippi seizures during the rest of 2010. The fact that this dramatic decline began after the enactment date may be an indication that pharmacies or other actors were experiencing the impact of the prescription laws in anticipation of the effective date. Our objective was to investigate this sharp decline, and thus we used both the enactment and effective dates as the break-point. We present analysis based on the effective date.

We do not observe meth use directly, and in the case of Mississippi, we do not observe it indirectly either. Mississippi's treatment data reported to Treatment Episode Data Set (TEDS), for instance, was incomplete for most of 2010 thus making it inappropriate for this analysis. And, while hospitalization inpatients and emergency room visits produce toxicology reports on patient drug screens that would be useful for this analysis, Mississippi does not submit its data to the Healthcare Cost and Utilization Project (HCUP). Without data on usage patterns, we turned instead to price data to look for evidence of impact on supply patterns. If the intervention had successfully limited meth availability in a meaningful way, we should have detected increases in price that may have limited availability of the drug on the margin.

We modelled quarterly state-level retail meth price using data from the DEA's System to Retrieve Information from Drug Evidence (STRIDE). STRIDE is a database of all drug exhibits sent by local and federal law enforcement agencies to the DEA for analysis. While not a representative sample of drugs in the US, it is the universe of all evidence seen by DEA labs and includes domestic and foreign sourced drugs, as well. Whereas NCLR measures seizures only, STRIDE contains drug exhibits from undercover purchases in addition to seizures from arrests. We used information from each drug exhibit to construct estimates of the inflation-adjusted price of a pure gram of meth for each state. We used a previously published hierarchical model (Jeremy, Pacula, Paddock, Caulkins, & Reuter, 2004) which first predicts expected purity, based on the median purity of a gram of meth exhibit from the distribution of meth exhibits from each state and quarter cell, and then uses that prediction to derive price. We limited our price predictions to retail transactions by excluding transactions where either party had more than 100 g of meth. We then aggregated number of meth labs seized and meth price to state by quarter cells for analysis. We explored a specification that used data at the month level, but were unable to obtain good model fits due to cells with missing data.

Synthetic control

The synthetic control estimator (Abadie, Diamond, & Hainmueller, 2010; Abadie & Gardeazabal, 2003) constructs a control time series by matching pre-trends in the treatment observation to a constructed control observation that consists of a weighted average from several potential control observations. This method is designed to evaluate interventions where there is only one observation in the treatment group, and thus is especially suited to analyzing comparative case-studies. Unlike ad hoc selection of control units, the synthetic control estimator selects the weights of the control unit algorithmically to remove subjective researcher bias. The synthetic control algorithm finds weights for each unit in the potential pool of controls by minimizing the mean-squared difference in the control variables between the treatment and the