Prescription Policies and Drug Overdose

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1 Context and Literature

In light of the current wave of the opioid epidemic in the USA that is leading to increasing 'deaths of despair', it is ever important to study the economy of addictive drugs. It is well documented that the origin of the crisis in the 1990s was due to supply side factors, namely aggressive marketing campaigns and relaxing of restrictions by healthcare providers and the pharmaceutical industry that led to higher prescriptions of opioids such as oxycodone (Maclean, Mallatt, Ruhm, & Simon, 2020). In later years, the illicit opioid market flourished in parallel with heroin becoming popular in the 2010s. With rising heroin prices, there was a surge in adulterated products, leading to the rising use of synthetic opioids such as fentanyl which is about 50 times more potent than heroin. The opioid crisis has come with a huge cost to the US economy. In just 2017, the economic burden for the lives lost to opioid overdose was estimated around $480.7 billion (Florence, Luo, & Rice, 2021).

So what is the main driver of overdose deaths? Some channels of causation can be discussed. For example, the effect of prescription policies on non-patients. I am interested in looking at what component of mortality is explained by statutory laws, since these were an important factor in the origin of the crisis. Even today there is no federal law regulating prescriptions, with most state policies being enacted only around 2017 (Davis, Lieberman, Hernandez-Delgado, & Suba, 2019). Although there is some evidence of mandatory prescription monitoring programmes being effective in curbing excessive misuse (Grecu, Dave, & Saffer, 2019), there is little research on the effect of actual supply limiting policies. Also, while such policies have been shown to reduce prescriptions and dosage, studies on ultimate health outcomes such as mortality is limited. This thesis aims to contribute towards the discussion about the efficacy of supply limiting policies, and will produce evidence towards the hypothesis whether these kind of policies drive substitution towards other illicit and dangerous substances. Furthermore, a current research gap according to the US Department of Health and Human Services (2020) is that studies need outcome measures before the intervention, which is what I aim to do thus contributing methodologically also.

2 Data

I intend to use public data from the National Center for Health Statistics (NCHS) on drug overdose deaths[1]. The data on deaths include different drug categories but are predominantly opioids which comprise historically abused drugs such as heroin, oxycodone, and fentanyl. It also includes deaths due to psycho-stimulant drugs. The NCHS data is aggregated at state-year-month level in the period 2015 to 2023, and I will further aggregate it to state-year level. The dates for state opioid prescription laws and regulations up until 2020 are obtained from US Department of Health and Human Services[2] and state government[3] reports respectively. This includes general statutory limitations and exceptions for opioid prescriptions relating to pain treatment, as well as interventions implemented by state Medicaid agencies. The final dataset will be a panel with the following information – state, year, drug deaths, and year of

[1] https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm

[2] https://www.fda.gov/media/147152/download

[3] https://www.azdhs.gov/documents/prevention/womens-childrens-health/injury-prevention/opioid-prevention/appendix-b-state-by-state-summary.pdf

implemented regulation or law. Furthermore, I also aim to find data from different sources for control variables such as state-wise doctor density, political leaning, etc. that could help the estimation.

3 Methodology

The effect of a policy intervention on an outcome is often estimated using difference-in-differences (DiD). The standard DiD framework can be extended to multiple time periods where treatment adoption is staggered (Callaway & Sant'Anna, 2021), which in this case are the state level prescription policies that are implemented in different years. This will allow me to construct the full event study. The non-parametric framework allows to capture the dynamics of real outcomes relative to the time of the policy (Colonnelli & Prem, 2022). It is similar to a dynamic two-way fixed effects model, but the aggregated causal parameter (ATT) is point identified. For state i in year t, the model is as follows:

$$Y_{it} = \phi_i + \phi_t + \sum_{k=-6}^{k=-1} \mu_k + \sum_{k=1}^{k=9} \mu_k + X_{it} + \varepsilon_{it}$$

Where Y_{it} is the outcome (number of drug overdose deaths), ϕ_i and ϕ_t are state and time fixed effects respectively, μ_k is an indicator for the time period relative to the policy intervention period, X_{it} is a set of controls, and ε_{it} is a state level clustered standard error. Since there is data on passed policies up to 2020, the data on outcomes can go back to a maximum of 6 years for a policy in 2020. Similarly, for a policy in 2015, there is data on the subsequent 9 years of outcomes. X_{it} would include the aforementioned doctor density, political leaning, including an indicator for whether there is already an existing prescription law in place in the state prior to the study period, an indicator for whether the year is pre- or post-COVID, etc. The set of controls will help reduce estimated standard errors. It is assumed $\mu_{-1} = 0$ so that all coefficients represent differences in outcomes relative to the period before the policy.

The main motivation for using this kind of model is to see how the outcome varies with length of exposure to the policy treatment i.e. to see if there are any delayed effects. There are some identifying assumptions. The timing of the policies should be uncorrelated to the health outcome. In other words, the states in which the policy is implemented should be similar to the other states based on observables. This can be verified qualitatively or by regressing an indicator of whether a state implements a policy on state fixed effects and the controls. Alternatively, the event study should reveal that the pre-policy μ_k coefficients should not be statistically significant from zero. This would be evidence that parallel trends holds.

Another interesting aspect to look at would be heterogeneous effects. The challenge with using aggregated data over a broad area is the possibility of finding null effects or noisy estimates. To see what the true driver of the effect is, I can split the data with respect to the control variables, or with economic variables such as average state revenue over the study period split into terciles for example. Also, overdose deaths are evidently not ethnically representative, so I can include a measure of the degree of ethnic fractionalisation in the state. The data should be easily available and this exercise would help tease out any interesting causal channels.

References

Callaway, B., & Sant'Anna, P. H. (2021). Difference-in-differences with multiple time periods. *Journal of econometrics*, *225*(2), 200–230.

Colonnelli, E., & Prem, M. (2022). Corruption and firms. *The Review of Economic Studies*, *89*(2), 695–732.

Davis, C. S., Lieberman, A. J., Hernandez-Delgado, H., & Suba, C. (2019). Laws limiting the prescribing or dispensing of opioids for acute pain in the united states: A national systematic legal review. *Drug and alcohol dependence*, *194*, 166–172.

Florence, C., Luo, F., & Rice, K. (2021). The economic burden of opioid use disorder and fatal opioid overdose in the united states, 2017. *Drug and alcohol dependence*, *218*, 108350.

Grecu, A. M., Dave, D. M., & Saffer, H. (2019). Mandatory access prescription drug monitoring programs and prescription drug abuse. *Journal of Policy Analysis and Management*, *38*(1), 181–209.

Maclean, J. C., Mallatt, J., Ruhm, C. J., & Simon, K. (2020). Economic studies on the opioid crisis: A review. *National Bureau of Economic Research*.

US Department of Health and Human Services. (2020). Substance use disorder prevention that promotes opioid recovery and treatment for patients and communities (support) act section 7024: report to congress on opioid prescribing limits. *Washington, DC: US Department of Health and Human Services*.