Milestone 5

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1.

More information on this project can be found on my Github repository.[1]

2.

3.

See References.

4.

This paper explores fentanyl seizures and deaths in the United States from 2011-2017, namely the increases of both. Zoorob uses two models; Model 1 shows that fentanyl exposure has a positive association with mortality rates, and Model 2 tries to estimate the causal effect of fentanyl exposure on mortality rates.

Zoorob runs a least squares regression for the first model. The model predicts overdose mortality as a function of fentanyl exposure. Fentanyl exposure takes into account the state, year, the natural logarithm of the number of test results containing fentanyl (in that state and year), and an error term. The standard errors are two-way clustered by state and year and includes population weights (Zoorob (2019a)).

$$Overdose_{ij} = \alpha_i + \eta_j + \beta_1 Fentanyl_{ij} + \varepsilon_{ij}$$

The second model uses a two-stage least squares regression:

$$\widehat{Fentanyl}_{ij} = \alpha_i + \eta_j + \beta_1 \left(Longitude_i \cdot Year_j \right) + \varepsilon_{ij} Overdose_{ij} = \alpha_i + \eta_j + \beta_2 \widehat{Fentanyl}_{ij} + \varepsilon_{ij}$$

Findings in the paper show that much of the variation in the increased overdose mortality is explained by fentanyl exposure, and that fentanyl deaths are highly correlated with geography, as the epicenter of the overdose crisis has shifted towards the eastern U.S.

5.

Appendix

References

Zoorob (2019b), Zoorob (2019a), Gary King (2000), Xie (2015), Xie (2014)

Gary King, Jason Wittenberg, Michael Tomz. 2000. *Making the Most of Statistical Analyses: Improving Interpretation and Presentation. American Journal of Political Science.* Vol. 44. https://www.jstor.org/stable/pdf/2669316.pdf?seq=1.

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[1]Github repository

Xie, Yihui. 2014. "Knitr: A Comprehensive Tool for Reproducible Research in R." In *Implementing Reproducible Computational Research*, edited by Victoria Stodden, Friedrich Leisch, and Roger D. Peng. Chapman; Hall/CRC. http://www.crcpress.com/product/isbn/9781466561595.

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Zoorob, Michael. 2019a. *Fentanyl Shock: The Changing Geography of Overdose in the United States*. *International Journal of Drug Policy*. https://www.sciencedirect.com/science/article/abs/pii/S0955395919301136.

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