

Letters

COMMENT & RESPONSE

In Reply We thank Tsai and Venkataramani for their comments, which raise important methodological issues and challenge the findings presented in our article.¹ They reconstructed the data set and stated that the association found between psychiatric bed numbers and prison populations disappears once they adjusted for year fixed effects or linear time trends.

Yet, they did not use the same data set as in our study. They interpolated the data, ending up with 104 observations, almost twice as many as the 53 observations in our analysis.¹ All the additional data points were not observed data but interpolated estimates. This changes the variance and standard errors and leads to completely different results. Computing the analysis with year fixed effects, as suggested by Tsai and Venkataramani, with the real data (available on request), the association between psychiatric bed numbers and prison population rates remains statistically significant (-3.15 ; 95% CI, -4.72 to -1.60). Adding a linear time trend to the original data set showed a similar result (-2.96 ; 95% CI, -4.66 to -1.25). We can conclude that the findings presented in our article¹ are consistent with the Penrose hypothesis, whether year fixed effects are added or not.

The comments of Tsai and Venkataramani point toward a wider methodological issue. If an association between 2 variables tests the hypothesis of a causal relationship, it is paramount to control for potential confounders. One needs to check whether the association is due to a third factor, such as overall time trends whatever such time trends exactly capture (eg, “underlying determinants of crime” as suggested by Tsai and Venkataramani).² In our study, we did not hypothesize any direct causal relationship between bed numbers and prison populations. We just established that there is an association and showed that this is unlikely due to chance. Obviously, there must be reasons for the association and mechanisms behind it. We considered macroeconomic variables, which, how-

ever, did not explain the association. Based on different hypotheses, further factors should be explored in future research. However, adjusting the association for overall time trends without knowing what factors and mechanisms the trends precisely reflect risks eliminating exactly the variance that one is interested in identifying.

As acknowledged in our article, the data have limitations—as it often happens in historical data sets—and there were not enough data to perform more reliable tests of associations over time such as cointegration tests.³

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1. Mundt AP, Chow WS, Arduino M, et al. Psychiatric hospital beds and prison populations in South America since 1990: does the Penrose hypothesis apply? *JAMA Psych*. 2015;72(2):112-118.
2. Listokin Y. Does more crime mean more prisoners? an instrumental variables approach. 2003. http://digitalcommons.law.yale.edu/fss_papers/564. Accessed December 1, 2015.
3. Ceccherini-Nelli A, Priebe S. Economic factors and psychiatric hospital beds: an analysis of historical trends. *Int J Soc Econ*. 2007;34(11):788-810.