Comments on Hatfield and Kosec’s “Local Environmental Quality and Inter-Jurisdictional Spillovers”

James Sallee

University of Chicago, Harris

May 16, 2013
Constitutional Design and the Scope of Authority
Logic of approach

- Many things determine pollution (geography, industrial mix, GDP, traffic, degree of sprawl, ...)
  - Environmental policy is one factor
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- Many jurisdictions affect policy (cities, counties, states)
  - Counties are one factor
Logic of approach

- Many things determine county borders (geography, economic development, population flows, ...)
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- Many things determine county borders (geography, economic development, population flows,...)
  - Streams are one factor
- Variation in number of counties small
- Conclusion: streams $\Rightarrow$ county borders $\Rightarrow$ pollution logical
- But, *ex ante*, expect weak relationship
What does methodology identify?

“...we find that doubling the number of jurisdictions...results in a 7.4 point increase in the AQI...”
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Streams in 1850 ⇒ Political institutions in 1900
⇒ Industrial mix in 1950 ⇒ Pollution in 2000

- Streams are not “shocks”, they are permanent
- Paper’s strategy must be identifying long-run impact of institutions; cannot think of estimates as telling us what changing jurisdictional structure today would do to pollution today
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- Streams are not “shocks”, they are permanent
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- Paper could benefit from explicit discussion of this
- Reference Acemoglu, Johnson and Robinson (2001, etc.)
Long-run causal channels and IV

- If jurisdictional structure really important to public policy, it will affect many things (growth, population, etc.)
- Causal effect of streams on pollution may have nothing to do with environmental policy; unclear if this is test of Oates (1972)
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- Exclusion restriction: streams only affect pollution via environmental policy
- Streams have other effects: Baqir (2001), Cutler and Glaeser (1997), Hatfield and Kosec (2012)
- If streams cause other things (growth) that affect pollution, then exclusion restriction violated
Results are surprisingly strong

- I argue that causal effect of streams on pollution should be small

- But results are remarkably strong and robust
  - 30% of variation in number of counties explained by streams
  - Streams stronger predictor of number of counties than any other variable
  - Streams stronger predictor of pollution than income, population density, rivers (!), water area
  - Adding state FE has modest impact on stream coefficient

- I argue that effect of streams on pollution should be long run, work through political economy's effect on growth and industry
- Thus, controlling for growth should impact coefficient
- Coefficient on streams changes very little when earnings and density added
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- Bigger MSA’s have more streams (even if topography uniform) and more counties
  - E.g., Chicago MSA has 14 counties; Peoria MSA has 5; probably more waterways in 14-county Chicago area
- Other controls are averages; this explains why they don’t matter
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- Log square area control has no effect... but paper uses 1970 area
MSA definitions change over time

Table: Number of counties in Houston MSA and Phoenix MSA over time

<table>
<thead>
<tr>
<th></th>
<th>Houston</th>
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<tbody>
<tr>
<td>1950</td>
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Economic growth may cause MSA to expand. Economic growth causes pollution. MSA expansion increases both total stream mileage and number of counties in a mechanical fashion (explains first stage) and this is correlated with growth (explains second stage).
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What is the source of variation?

- IV is plausible identification strategy
- But, need to “see” the data to improve transparency
- Inside of a state, what types of MSA’s have more or fewer counties?
- Are we just comparing small and large cities?
- If not, how can correlations be so strong?
Standard errors are very surprising

Table: Standard error from OLS and IV regressions

<table>
<thead>
<tr>
<th>Column</th>
<th>OLS (Table 2)</th>
<th>IV (Table 3)</th>
<th>First-stage $R^2$</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>(1.21)</td>
<td>(2.73)</td>
<td>0.30</td>
</tr>
<tr>
<td>2</td>
<td>(1.54)</td>
<td>(1.55)</td>
<td>0.66</td>
</tr>
<tr>
<td>3</td>
<td>(1.43)</td>
<td>(1.47)</td>
<td>0.66</td>
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<tr>
<td>4</td>
<td>(1.37)</td>
<td>(1.38)</td>
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- IV standard error = OLS standard $\Rightarrow$ first stage $R^2=1$
- IV standard error should be larger in inverse proportion to the $R^2$ in the first stage
Other comments

- Should counties be so important? What about using number of municipalities?
- Why log the number of counties? (With minimal variation, should be able to control for each county size nonparametrically)
- Why is elevation variance a control instead of an IV?
- Does it matter that Clean Air Act regulates at county level? (Small counties more likely to exceed limit on average; large counties more likely to exceed limit for at least one point?)
- Conceptually, why is number of counties not normalized by population or landmass the right metric?