

Question 3

Lipscomb and Mubarak's paper "Decentralization and Water Pollution Spillovers: Evidence from the Re-drawing of County Boundaries in Brazil" has a two main objectives. The authors want to estimate the net effect of decentralization on water quality, a policy relevant parameter, and to test their model of strategic pollution. Their proposed model of pollution predicts that local governments will strategically enforce pollution regulations in a manner to simultaneously maximize the quality of water for their citizens while allowing pollution close to the downstream border of the county. In other words, the water will have higher levels of pollution the closer you measure to the exit point of the river from the county in question (it affects people living *within* that county less). According to such a model, it is not immediately clear what the net effect of decentralization will be on overall water quality because of the potential magnification of the externalities of pollution. More local control could imply a less socially optimal outcome. Another closely related question is whether budgetary changes affect spending to offset the potential externalities from pollution – which is especially relevant in this case because of the specific features of the decentralization in Brazil.

The measurement of spillovers effects can be quite complicated and the data used by Lipscomb and Mubarak provide a good base for addressing their questions. The authors use a panel dataset of over 10,000 water quality measures from 372 monitoring stations across Brazil that are combined with evolving county maps using GIS. The measure of water quality used is Biochemical Oxygen Demand (BOD); a measure of pollutants that is said to be relatively easy to measure that is frequently used to judge water quality. BOD naturally leaves water at an exponential rate and the authors take this fact into account. The key variables used in the model are the change in BOD between the downstream and upstream monitoring stations, the distance of the monitoring stations from the relevant county boundaries, and the number of counties the river flows through between monitoring stations.

Population density as it may relate to decentralization, and hence to water quality is the major source of endogeneity that Lipscomb and Mubarak deal with. In order to empirically test whether or not this type of endogeneity exists in the data, the authors use a model of non-uniform population and find that the data are consistent with the supposed endogeneity. I find their test to be convincing.

For identification the authors used the three variables mentioned earlier and some others to control for the correlation between the number of boundaries crossed in between upstream/downstream stations, the distance to stations from borders and average county size etc. The local geography of the area may also bias the results by since the rate at which BOD naturally leaves the water (e.g. it dissipates faster if the water is moving rapidly). Changes to the county lines provide variation for both the number of crossing and the distance from the stations to the boundaries. For this source of variation to be appropriate, the authors must assume that the county boundaries are redrawn in a way that is not related to the changes in pollution (except for population of course). Since the authors control for area size, population, distance, station pair fixed effects and other local area characteristics I am unable to come up with any concrete reason why their identification should not be valid. Of course, looking at similar data in other countries might shed light on this issue.

The authors' interpretations of the parameters are clear and they do find that their model of strategic enforcement of pollution regulation fits the data. Of course strategic enforcement isn't necessarily the reason for the differences within counties, since it is possible that there is some other reason why there is more pollution closer to the exit of the river from the county. However, I think that strategic enforcement is the most plausible explanation (especially since county boundaries change over the course of the sample). The authors do not find a net effect on total pollution from decentralization that is statistically different from zero. It seems that the budgetary effects balance the pollution near county borders effects.

This paper is a very thoughtful attempt at measuring the parameters related to policy and to the economic questions raised by the authors. However, because of the highly unique situations that gave rise to their data it is doubtful that the results could be applied more widely. The money given to the counties upon decentralization and the other issues already discussed are the main reasons that these results are probably not generally valid. However, the authors do not make a claim for greater applicability of their results, only that evaluations of decentralization policies should try to account for externalities that might not be best controlled at the local level (i.e. cases where it is might be harder to reach a social optimum). An interesting direction of influence that wasn't really discussed is features *other* than characteristics like population and size that might be used to draw the boundaries of the various counties. It is conceivable to me that whoever owns the monitoring stations might have interests in being in a particular county if decentralization is a possibility for the general area (family, schools, etc.). Particular counties might also want to have monitoring stations; if, for example, they are especially concerned with water quality. While I am sympathetic to the authors' argument that monitoring plants aren't being built in strategic locations, it is possible that there are some potential sources of endogeneity that would be nearly impossible to test without much more detailed information. However, if it were the counties that wanted facilities to measure water quality then we might observe fewer stations close to the downstream borders of counties (why bother as far as the county is concerned). As long as these instances of endogenous location of the monitoring stations are rare or do not vary systematically with water quality the results of the paper should not be too much affected.