Testing for Environmental Gentrification: Migratory Responses to Changes in Environmental Quality[*]

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Abstract

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Abstract

The environmental justice movement asserts that minority households face greater exposure to environmental pollution than white households. Supporting this assertion are numerous studies documenting a positive correlation between the location of hazardous waste facilities and minority or poor populations (*e.g.* United Church of Christ 1987, Goldman and Fitton 1994, Mohai and Bryant 1992). This correlation is often interpreted as direct evidence of environmental racism. Although others have challenged these findings (e.g. Anderton et al. 1994, Daniels and Friedman 1999), concerns about environmental racism have prompted the US Environmental Protection Agency to create a national Environmental Justice Office and several states to craft legislative responses to the perception of environmental racism.

The work of Tiebout (1956) provides a potential alternative to racism as an explanation for these correlations. Tiebout hypothesized that households sort between communities based on differential demands for local amenities such as school and environmental quality. If we consider environmental quality a normal good, even if all people have the same tastes, we should expect that lower income households will accept lower environmental quality in exchange for lower housing costs. Thus, when polluters enter an area, lowering both environmental quality and land prices, poorer households may move in to take advantage of these lower costs – or, they may be less likely to leave than are richer households. Because minority households have lower average incomes than white households, this differential sorting could lead to the observed correlations between minority status and environmental quality.

Surprisingly, limited research exists on migration effects associated with changes in environmental quality. Been (1994) provides the first attempt to evaluate the neighborhood composition effects from changes in pollution exposure. She evaluates the change in community composition following the citing of four hazardous waste landfills, three incinerators and seven landfills – using as controls the changes in the host Census tract relative to the host county. As would be expected, given its small sample size and lack of controls, the study provides limited results. Been (1997) reconsiders the issue evaluating demographic changes for 544 "communities" that hosted active commercial

hazardous waste treatment storage and disposal facilities. She finds little evidence that the citing of facilities lead to changes in demographics. This study again defines host Census tracts as the effected "community." As controls, the study compares changes in host tracts to changes in all non-host tracts. Alternatively, in regression models the study uses only a very sparse set of controls, omitting exiting facilities, lagged effects of older facilities, and other demographic variables other than baseline racial composition.

While this work represents a significant advance in the environmental justice literature, three specific concerns raise doubts about the inference that can be drawn from Been's analysis. First, as Been points out, it is not clear that identifying host Census tracts as the effected community is appropriate. The findings of environmental justice studies have been shown to be quite sensitive to spatial definitions. While relatively homogeneous in population, Census tracts can vary significantly in size and are often quite large making it possible for their use as a "community" definition to mask demographic shifts that occur within each tract. Additionally, because facilities are often located along Census tract boundaries, attaching facility effects to their host tract introduces significant noise to the empirical model. Second, the use of all non-host census tracts as controls is potentially problematic. If sub-regions of the country that host facilities are experiencing demographic shifts that vary systematically from sub-regions that do not host facilities, the use of all other tracts as controls could lead these systematically varying demographic shifts to mask environmentally driven composition changes that are occurring within the host sub-regions.[1] Third, using the presence of a hazardous waste treatment storage and disposal facility in a given tract to measure environmental quality abstracts from the fact that there is a great degree of risk heterogeneity associated with different facilities. This heterogeneity arises both from differences in the quantity and toxicity of emissions among facilities and differences across tract-facility pairs in the average distance that tract households are located from the facility.[2]

[1] This concern will hold whether the appropriate "sub-region" is a metropolitan area, urban cores, certain states, or any region whose spatial definition is larger than that of a census tract.
[2] The second factor is driven both by heterogeneity in where facilities are located within tracts (i.e center vs. border) and in differences in tract size.

Several of these issues are addressed in more recent work by Cameron and Graham (2004). They evaluate how demographic composition, measured at the Census block level, varies across time and distance from six superfund sites – finding heterogeneous demographic shifts across the six different facilities. This approach yields much smaller neighborhood definitions, uses neighboring census blocks located further from the facility as controls, and directly accounts for variation in risk associated with varying distances from the facility. Their analysis provides an excellent case study for these six sites. However, due to the limited number of facilities studied, it is difficult to draw broader inferences from their work.

In this paper we extend research on environmentally driven migration on two fronts. First, we provide a theoretical model of vertically differentiated communities and derive the comparative statics for changes in community populations that are associated with changes in environmental quality. We find that over-all migration consistent with the Tiebout hypothesis provides clear predictions for changes in total populations. However, even with differential migration, the model does not provide clear-cut predictions for changes in community composition *relative to other communities*. We clarify the special cases where it does and the information that would be required for better tests of the hypothesis.

Second we provide an empirical analysis of environmentally induced migration that attempts to overcome the limitations of previous studies. Toward this end we evaluate the impact of entry and exit of TRI facilities, as well as changes in toxicity weighted emission levels, on changes in local community population and racial composition -- controlling for demographics and other location specific effects. As our unit of analysis, we use a set of "communities" defined by equally spaced one mile and half mile circles and attach TRI emissions to these "communities" based on their location relative to the facility's location. This approach to community definition overcomes many of the limitations associated with defining host census tracts as the effected community and allows us evaluate changes in exposed "communities" relative to non-exposed proximate communities — specifically those non-exposed "communities" located in the same zip code as the exposed "community". Further, because migratory responses may be highly non-linear functions of demographics we use both linear

regression and a non-parametric matching estimator in the analysis. We find clear evidence of migration correlated with TRI facility emissions and their arrival or exit from a "community". Furthermore, we find significant evidence that exposure to toxic air emissions causes the composition of a community to become less white over time.