

Bayou Blues: The Social Structure of a Disaster

A Case Study of Hurricane Katrina

Brian L. Levy ¹

Departments of Sociology and Religion, May 2007

Faculty Advisor: Dr. Jeremy Reynolds

The Roosevelt Institution at The University of Georgia

Executive Summary

This paper uses Hurricane Katrina as a case-study to examine the extent to which environmental racism-classism and residential segregation conjoin to produce a greater disaster risk for poor, black Americans. The concept “environmental racism-classism” suggests that the impoverished and minorities are much more likely than the middle class/wealthy and white Americans to be mal-affected by environmental harms. Residential segregation indicates that the impoverished and minorities tend to reside in homogenous communities, creating a separation from other social groupings. Disasters offer a unique realm of analysis for environmental racism-classism because, unlike most other research topics which consider a produced harm after a population is already concentrated, disasters enable analysis of how individuals are housed in areas with a pre-existing risk. Race is found to be a strong predictor of flood damage, while class is found to be unrelated. Additionally, location along the coastline is found to be an important variable for predicting flooding. These results, if accurate, undermine the notion of a race-class nexus for production of harms.

Introduction

Race and class are widely regarded as two of the most influential variables affecting residential inequality within a community. An important factor of residential inequality is the

concept of “place stratification,” that some places are inherently more desirable for occupancy (Logan 1978). Place stratification is consistent with the framework of capitalist America. However, one interesting question is: Why are certain places more desirable to inhabit than are others? Environmental racism and classism theories suggest that areas with high concentrations of minorities or poor individuals—highlighted by the residential segregation literature—are disproportionately mal-affected by environmental harms, especially toxic releases (Allen 2001:20). Environmental racism and classism research is relevant to the context of a hurricane because it addresses the extent to which individuals are likely to be harmed by an environmental problem, such as a disaster.

In this paper, I examine how and why racial and class groups are located within or outside of areas prone to flooding during a hurricane. While most environmental racism and classism research suggests that negative effects are produced after the congregation of various social groups, this examination deals with a pre-existing risk. A wealth of literature exists on the former topic, but negligible and inadequate research has been performed on the latter. Along these lines, Susan Cutter of the Hazards Research Lab noted that socially fostered risks “are largely ignored in the hazards and disaster literature” (2005). To address this issue, I will employ a case study of Hurricane Katrina’s flooding in New Orleans.

The variables isolated for analysis, race and class, are noted as especially significant in the socio-political framework that is now common in disaster research. At this point, gender is also receiving substantial attention in the literature (Fothergill and Peek 2004:90). I also couple the socio-political model with a historical context for analysis, as is deemed important for adequate causal understanding by a wealth of researchers (Cutter 2005; Frymer, Strolovitch, and Warren 2005).

Literature Review and Theoretical Perspectives

Place Stratification and Residential Segregation

Place segregation theory, popularized by Logan, posits that metropolitan areas have various communities, each with its own level of desirability for inhabiting (1978). Dominant groups tend to occupy the most desirable of these places, while trying to keep less fortunate groups at a distance (Freeman 2000:18). This largely makes sense, as the dominant groups are likely to have a large quantity of the resources necessary to procure the most preferred housing within a region. Additionally, the dominant groups are more likely to have well-defined social networks through which they can maintain a monopoly on the prime real-estate.

In addition to their resources and ties, the dominant groups employ “institutional mechanisms such as redlining, exclusionary zoning, and the targeting of subsidized housing to minority neighborhoods” to buttress the stratification of place (Freeman 2000:18). Redlining is the process of banks denying home loans to communities viewed as ‘high risk’; such communities are often largely populated by minorities or the poor. Exclusionary zoning is the limitation of housing in certain areas to single-family occupants; this often disproportionately excludes minorities and the poor from living in certain communities, because they tend to live with extended family at a greater rate. These mechanisms also greatly lend themselves to residential segregation processes. After all, in relegating various social groupings, such as races and classes, away from the ideal housing, these groups can easily be further divided into the remaining housing based on the same traits.

Black Americans are extremely vulnerable to such racially based residential segregation (Charles 2003). In 1980, they exhibited extreme isolation from white Americans in ten metropolitan communities [of the sixty major communities in America], and by 1990,

that number had jumped to twenty-nine metropolitan areas (Massey and Denton 1989)—an area that encompassed approximately forty-percent of the total black American population (Charles 2003:171). Despite the data's limitation to only the most severe and extreme forms of segregation, forty-percent of all black Americans were still included. Massey and Denton went on to further assert that black Americans are comparably alone in their experiences of residential segregation; Latinos and other minorities, although encountering increasing segregation, have thus far undergone only partial and passing segregation (Charles 2003:171). Black Americans, however, clearly experience widespread, tangible residential segregation throughout America's metropolises. A body of largely anecdotal evidence suggests that this is the result of their desire to live within a racially homogenous community; nevertheless, as Freeman highlights, a treasure trove of studies have pointed out that most black Americans do, in fact, seek to live in a racially integrated neighborhood (2001:19).

Besides black Americans, the poor are also extremely vulnerable to residential segregation (Kawachi 2002: 165). According to Massey and Fischer, an interaction between income inequality and residential segregation had, by 1990, clearly spatially isolated the poor (2000). This isolation was very extensive, affecting a wide array of racial and ethnic groups (Massey and Eggers 1990; Jargowsky 1996). These results are highly consistent with the place stratification theory. The rich ought to have greater resources and proportionally greater power; therefore, they will occupy the most desirable housing and attempt to relegate the poor to the lower quality communities.

In fact, race and economic class may act in tandem—each interacting with the other. Because a greater percentage of black Americans are poor compared to Caucasians, racial segregation will lead to a de facto class segregation; in such a system, all black Americans

would suffer regarding the surrounding community, whereas only some white Americans would be worse off (Massey 1990: 333). On the whole, therefore, racially based residential segregation seems to benefit poor whites and hurt poor blacks (Massey 1990: 336). The reverse of this system should also hold; in a community segregated largely based on economic class, poor black individuals would again fair worse based on their disproportionate concentration among the poor. In this way, there seems to be a nexus of racially based segregation and economic class based segregation, with poor black Americans faring the worst.

It is worth noting that residential segregation is not a newly developing phenomenon; rather, it is rooted in America's history of institutionalized racism and classism. The South's segregated past is best noted through the lenses of spatial settlement; migration of impoverished individuals and racial minorities into urban cities has historically been followed by rich, white flight into the surrounding suburban communities (Cutter 2005). Further, public housing projects were created in the most undesirable of communities in an attempt to deal with arrival of the poor and black Americans (Cutter 2005). This is one of many reproductions of the deep-seated Jim-Crow attitude of the South that was continually reproduced throughout the 1960s and beyond (Frymer et. al. 2005).

Later, the Federal Housing Act permitted banks and home loan companies to redline their policies to exclude black communities (Frymer et. al. 2005). By extension, the communities of the very poor could also be barred, and in most instances, they would likely already be included because they tended to be inhabited largely by black Americans. Entrenching place stratification into the home purchasing process, the act of redlining also further enabled residential segregation. Despite the fact that these events occurred nearly a

half-century ago, they are still of critical importance today because they established the segregated housing system upon which our current system was built.

Environmental Racism and Classism

The majority of environmental racism and classism literature suggests that environmental harms are produced in communities already inhabited by minority races or the poor. These harms are then conceptualized in two discrete categories: noxious facilities and toxic releases/pollutants (Ringquist 2005). Such a distinction is necessary because while noxious waste facilities may be located in one area, their effects may be widespread. Therefore, the location of the facilities and the pollution effects need to be assessed.

Performing a meta-analysis of forty-nine previous comprehensive and robust environmental equity studies, Ringquist finds “significant evidence for environmental inequities based upon race;” further, he comments that this risk holds for both noxious facilities and pollutants (2005: 232). Still, pollution levels appear to be slightly less inequitably divided than are noxious facilities (Ringquist 2005: 232). These inequalities are especially true for black Americans; their 1995 population in counties rose along with the amount of toxic releases (Allen 2001: 20). Some researchers argue that these findings represent data that are statistically significant but not substantively important; nevertheless, the results do seem important because the pollution levels measured are actually lower bounds and could—and very likely will—be higher (Ringquist 2005: 234).

Interestingly, the level of analysis complicates the environmental racism hypothesis. Levels of race-based inequality appear to be significantly smaller for the entire United States than for various regions and communities (Ringquist 2005: 238). This suggests that environmental racism is an existent problem for some areas while it is not for others. Again,

such findings lend credence to the utility of history in the analysis of environmental racism. Logically, if a community has a deep-rooted culture of racism, it would then be more likely to exhibit contemporary environmental racism.

The evidence for income-based environmental inequalities is less pejorative. In his meta-analysis, Ringquist notes that data supporting income-based inequity is barely statistically significant, and he therefore categorizes the inequality evidence as “weak” (2005: 234). However, toxic releases do appear to be class-based, as social class, fiscal capacity, and pollution potential all interact to produce levels of toxic releases (Allen 2001: 21). Further complicating the issue, income-based environmental inequalities, like race-based inequalities, have a much greater effect in regions and communities than they do across the nation (Ringquist 2005: 238). It seems, therefore, that income-based inequalities do exist—albeit less extensively than race-based inequalities—within various regions and communities of the United States. Yet again, historically based analysis would prove fruitful in understanding where and why these imbalances occur.

Recently, researchers have highlighted the importance of integrating race and economic class in analysis. In fact, ignoring the race-class nexus and viewing one variable as the primary cause of inequality tends to cause the devaluation of the other variable (Downey 1998: 774). Actually, race and class often interact in a very complex manner, and along with other variables, they produce environmental inequities (Downey 1998; Allen 2001). Undoubtedly, the race-class nexus can provide many confounding problems for environmental inequality research.

To deal with these issues, an institutional model of environmental racism-classism is powerful. It enables a more complex view of reality in which class and race are both

important determinants of inequity, acting in tandem as opposed to individually; additionally, the model provides an expectation that race and class will be highly correlated (Downey 1998: 774-775). To be sure, the institutional perspective of the race-class nexus is extremely logical since it is an accurate depiction of society.

Outside the realm of literature on the environmental inequity produced in already residentially segregated communities, little literature exists on how lower class individuals and minorities are segregated into areas that have a high disaster risk. This idea differs from the way in which environmental racism-classism is generally conceptualized as it deals with a risk that is already present, rather than one that is produced.

It is worth noting that a good deal of research has been done on the way that poor individuals and minorities are disproportionately mal-affected by hurricanes (Fothergill and Peek 2004; Frymer et. al. 2005; Mulcahy 2005). In a review of relevant literature, Fothergill and Peek noted that these groups experience more housing destruction due to lower construction quality and resources for preparation, more injury, more psychological problems, and more death. Still, none of these data address the issue of whether or not the poor and minorities are likely to be residentially segregated in an area with a high risk for environmental disaster.

A common belief is that the wealthy—and typically white individuals, as well—take higher land in climates that are at risk for hurricanes (Smith 2005; Sze 2005). Morrow underscores this view in a scathing account of residential segregation in environmentally inequitable lands:

The dwellings of the poor are often located in vulnerable locations, such as floodplains. While the affluent build large homes in coastal floodplains for the ambiance, the poor are likely to have little alternative if their livelihoods are tied to tourism, fishing and other coastal enterprises. Urban squatter camps are usually concentrated precariously on the most marginal and vulnerable land (1999).

While these assertions may seem logical, they are buttressed by no empirical data; some proof would certainly seem important. Additionally, although living on higher land appears to offer greater security during a hurricane, it may, in fact, not. Lower lands could be surrounded by higher lands and therefore be protected. Nonetheless, higher elevation undoubtedly offers some protection in the event of a hurricane. Clearly, enhanced and more extensive research is needed on the topic.

Theory Application to New Orleans

Based on the place stratification theory, the original settlers of New Orleans should have chosen to locate at the most desirable location. Interestingly, the settlers chose to inhabit Vieux Carre (the French Quarter), which also happened to be the area of the city with the highest elevation (Cutter 2005). While the French inhabited the French Quarter, the English soon after settled in the Garden District, another area with high elevation. This suggests that for New Orleans, elevation ought to have a strong correlation with desirability of location. After all, as was noted earlier, elevation offers some protection during a hurricane.

Once additional residents migrated to New Orleans, residential segregation—based on its widespread nature as highlighted in earlier literature—likely occurred. In fact, prior to Hurricane Katrina, it seemed that “topographic gradients doubled as class and race gradients”

(Smith 2005). Again, though, this assertion lacks empirical validation through data. If true, however, it nicely highlights the interaction of residential segregation and environmental racism-classism.

Environmental racism-classism is definitely not absent from New Orleans. In an area known as Cancer Alley between New Orleans and Baton Rouge, over 125 chemical and oil plants reside next to low-income, predominantly black American communities (Sze 2005). This area has been the site of extensive health problems, and it was actually the site of one of the first instances of the term “environmental racism” being used. Indubitably, Cancer Alley underscores that both residential segregation and environmental racism-classism are thriving in New Orleans and that these processes can work in tandem to produce horrific results.

The interesting question that segregation and environmental inequality literature has yet to answer is how and why residents of New Orleans were likely to be concentrated in areas that flooded extensively during Hurricane Katrina. To be sure, this issue is of utmost importance for policy makers and city workers alike. With the renewed emphasis on disaster planning that followed the hurricane, this knowledge would prove valuable to these individuals as they prepare for future hurricanes, evacuations, and post-disaster response.

Hypotheses

First, I hypothesize that black Americans were likely concentrated in the areas that received the highest floodwaters. New Orleans has an exceptionally large large black population, and this fact, coupled with the South’s history of segregation of and hostility toward black Americans, is likely to produce a social climate conducive for relegating them to the most undesirable communities. Further, New Orleans appears, more so than most

communities, to stratify its neighborhoods based on elevation and perceived risk of flooding in a hurricane.

In addition, I hypothesize that the poor were also likely concentrated in the areas that experienced the greatest flooding. The poor tend to have the fewest resources and social ties to activate when searching for housing. Therefore, they will likely also be relegated to the worst communities, which should then fare the worst during hurricanes.

Moreover, I hypothesize that poor, black Americans disproportionately inhabited the communities that underwent the absolute worst flooding after Katrina. Based on the race-class nexus identified earlier, both traits should work in combination to produce the absolute worst effect in residential segregation, affording them the opportunity only for the worst locations. Of course, this and the two earlier hypotheses are no guarantees since flooding of an area depends to an extent upon the path and duration of the hurricane, as well. Therefore, some deviation from these expectations should be noticed.

Research Data

To test my hypotheses, I use demographic data from the Greater New Orleans Community Data Center and flooding data from the Federal Emergency Management Agency (FEMA). These data are particularly important for my study because they provide the best available account of post-Katrina flooding, as well as the necessary information regarding race and income. Unfortunately, though, the flooding data are aggregated at the district level within New Orleans. Thus, for evaluation of the variables race and income, this study utilizes the 14 Planning Districts: French Quarter, Garden District and Central City, Uptown, Mid City, Lakeview, Gentilly, Bywater, Lower Ninth Ward, New Orleans East, Village de L'est,

Venetian Isles, Algiers, New Aurora and English Turn, and the Warehouse and Central Business District.

While 14 Districts may seem like a small sample size, I believe that it nevertheless warrants examination for two reasons. First, these are the best data currently available. As such, they at least provide some insight into the disaster phenomenon that is otherwise impossible. Moreover, the 14 Districts encompass the totality of New Orleans, and the sample is therefore exhaustive of all possible data sources. No random sampling was taken.

Based on the hypotheses, I use two independent variables: race and income. Race, specifically status as a minority, is measured as percentage of individuals within the Districts that are non-white. This is meant to include Latinos and Hispanics as minorities. Income is measured at the District level as percentage of households that are impoverished, based on the national Census definition. The Greater New Orleans Community Data Center provides the data for the independent variables on their website (GNOCDC). In addition to these independent variables, I use one dependent variable: flooding. Flooding is conceptualized as a home receiving “major damage” or “minor damage” within the relevant FEMA report (FEMA 2006). It is then measured at the district level as the percentage of all homes that received flood damage. It is worth noting that damages from Hurricanes Rita and Wilma are also included within the analysis; however, as they had a dramatically less significant effect on New Orleans, their inclusion likely plays a negligible role in evaluating the impact of Hurricane Katrina.

These variables conform very well to the socio-political model that is growing increasingly common in disaster research; however, gender is excluded as a variable for multiple reasons. Foremost, gender is not typically associated with residential segregation and

is largely absent from that body of literature. After all, men and women are ubiquitous in society. Furthermore, gender is also missing from the environmental discrimination literature. For these reasons, as well as the prominence accorded to race and economic class within the current discourse, race and class are the only two variables analyzed.

I also include proximity to coastline as an additional variable for analysis. Proximity is a logical variable to include when measuring the effects of a hurricane. This variable was nominally conceptualized at the Planning District level as whether or not the District bordered Lake Pontchartrain (1=no, 2=yes).

Research Methods

To determine how race and class affect flooding in a disaster, I examine the bivariate relationships between race and flooding, as well as between income and flooding. These analyses help to initially evaluate the hypotheses 1 and 2. Next, I employ ‘nested models’ regression analysis of the relevant variables in an attempt to generate an appropriate model for predicting flooding rates. ANOVA is then used to test the overall effectiveness and significance of this model.

Results

Hypothesis 1

Pearson R: Percent Minority and Percent Flood

Pearson Correlation	.524
Sig. (2-tailed)	.055

Hypothesis 2

Pearson R: Percent Flood and Percent Flood

Pearson Correlation	.094
Sig. (2-tailed)	.750

Regarding Hypothesis 1, the Pearson Correlation value between percent minority and percent flooding is .524, with 2-tailed significance at the .055 confidence level (n = 14). The Pearson value is remarkably high, which indicates a strong correlation between race and

flooding. Granted, the .055 confidence level is slightly higher than is typically desired; nonetheless, one can expect nothing lower with only 14 cases. In fact, that the confidence level is so low is also quite extraordinary. Further, the .055 value may even be irrelevant, since all of the homes within New Orleans are included in the analysis and no sampling is used. In sum, these data suggest a strong correlation, and this leads to a confirmation of Hypothesis 1.

Regarding Hypothesis 2, the Pearson Correlation value between percent poverty and percent flooding is .094, with 2-tailed significance at the .750 confidence level (n = 14). Not only is the Pearson value notably low, suggesting little if any correlation, but also the .750 value is very high. While it may be the case that with less aggregated data this hypothesis would be confirmed, it seems prudent to reject Hypothesis 2. The lack of correlation evidenced here may be the result of heterogeneity in the distribution of the impoverished. Whereas minorities could be concentrated in certain Planning Districts, it seems likely that the poor are more equally dispersed throughout all the Districts.

Percent Minority and Coastline Proximity Model

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-50.191	25.379		-1.978	.074
% Minority	.677	.264	.481	2.564	.026
Lake Coastline (yes/no)	42.781	13.706	.585	3.121	.010

a. Dependent Variable: % Flood

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10555.842	2	5277.921	8.787	.005 ^a
	Residual	6606.890	11	600.626		
	Total	17162.732	13			

a. Predictors: (Constant), Lake Coastline (yes/no), % Minority

b. Dependent Variable: % Flood

Due to the strong relationship between minorities and flooding, it seems necessary to examine whether or not incorporating the proximity to the coastline into the regression analysis will influence this relationship. The resultant model (above) is actually an extremely robust predictor for flooding, with a Pearson correlation value of .784. Additionally, this model explains 61.5 % of the variation in flooding levels. Not only does the model have a very strong correlation with flooding, but it also has an ANOVA significance value of .005. This is indicative of a very sound model that has a low chance for error. Both of the variables are also independently significant. The model demonstrates that both being a minority and living near the coastline have positive relationships with flooding. Moreover, the effect of minority status on flooding barely weakened from the initial bivariate analysis to this model. This indicates that minority status and proximity to the coastline have independent effects on flooding.

Percent Minority, Percent Poverty, and Coastline Proximity Model

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-64.776	36.966		-1.752	.110
	% Minority	.544	.361	.387	1.505	.163
	% Poverty	.603	1.079	.158	.560	.588
	Lake Coastline (yes/no)	48.221	17.173	.660	2.808	.019

a. Dependent Variable: % Flood

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10756.399	3	3585.466	5.597	.016 ^a
	Residual	6406.333	10	640.633		
	Total	17162.732	13			

a. Predictors: (Constant), Lake Coastline (yes/no), % Minority, % Poverty

b. Dependent Variable: % Flood

When the poverty variable is added to the above model, the resultant model's (above) Pearson correlation value barely changes. Additionally, the resultant model's significance weakens. For these reasons, the addition of poverty to the model is removed in favor of the previous model. Again, the heterogeneity of poverty likely diminishes its value for this analysis, especially with data aggregated at the Planning District level. Further, a moderately strong ($R = .561$) and significant (.037) relationship exists between the variables minority and poverty. This close relationship suggests that the variables are too close to be included in the same model. Minority status is included instead of poverty because of its stronger relationship with flooding, as well as the superior strength of its resultant model.

Finally, it is also worth noting that the French Quarter and the Garden District—the areas traditionally settled by rich, white individuals—received very little flooding. In the

French Quarter Planning District, only 1.67 % of all homes experienced flood damage.

Unfortunately, the data for the Garden District Planning District include the Central City community, as well as other communities, that have high concentrations of minorities and poor individuals. Therefore, the 26.56 % of homes that experienced flood damage reflects the inclusion of non-rich, non-white persons. However, upon aerial analysis of the flooding, it is clear that few, if any, homes within the actual Garden District experienced flooding.

Conclusions

The results presented suggest an entirely new realm of issues for policymakers interested in residential segregation and environmental justice. With renewed scrutiny of the notion that individuals have fair and equal access to housing, public policy must begin to address the possibility that minorities are unjustly concentrated in areas prone to disasters and their effects. This idea joins the growing cacophony of voices suggesting that, while America may have ostensibly ended racism, its historical roots still permeate our society and its institutions. Such a historical production of harms seems tacitly supported, based on the fact that the traditional white communities of the Garden District and French Quarter received little flooding. Moreover, history's significance has been highlighted as relevant for disasters by many researchers (Cutter 2005; Frymer, Strolovitch, and Warren 2005).

In addition, proximity to the coastline is an issue that could warrant increased attention from policymakers. Certainly, this variable seems logically related to hurricane flooding. Nevertheless, many individuals tend to inhabit these coastline properties. To the extent that these settlement patterns persist, the likely devastation from hurricanes in such locations could raise a number of policy questions. Effectively dealing with such problems proactively could be an invaluable component of any proposed disaster policy.

Interestingly, unlike race, class—specifically being in poverty—does not seem to be associated with experiencing flooding after a Hurricane. This eliminated the possibility of a race-class nexus for the production of harms. These findings somewhat deviate from previous research, which suggests that class plays at least some role in causing environmental harms. Nevertheless, the data were undeniably general, and because the effect of class is not predicted to be as strong as that of race, more robust analysis may actually illuminate an association. Either way, the relevant debate over the role of class in environmental classism literature seems warranted.

Of course, the conclusions of this study could be expected to change based on the type of disaster examined. Tornadoes offer an example of a disaster that may be race-class blind. Unlike hurricane flooding, which is somewhat predictable, the occurrence and subsequent path of a tornado is highly uncertain. To be sure, poor individuals are likely to have less durable houses and experience more housing destruction; nevertheless, the likelihood of encountering the tornado does not seem to be strongly related to race or economic class. Future research would do well to consider not only the disaster type, but it could also explore the rebuilding process. Following a hurricane that called national attention to local race-class inequalities, are these inequalities likely to persist in rebuilding? Do the same residential concentration patterns repeat themselves, or does the illumination of the inequalities break the historical cycle of segregation and lead to more equitable, heterogeneous settlement?

Ultimately, this study is merely the beginning of a wealth of possible research on the connection of residential segregation and environmental justice in relation to disasters. Researchers would do well to consider the preceding as well as other unmentioned possible ideas that may be brought to light as this body of literature expands.

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Brian Levy is an Honors Program Student and recipient of the Bernard Ramsey Honors Scholarship at the University of Georgia. He is also Policy Director for the Roosevelt Institution at UGA and a third-year student majoring in sociology and religion, while studying for a minor in anthropology. Upon graduation in May 2007, Brian plans to pursue graduate studies in public policy. Questions or comments may be addressed to Brian@uga.edu.

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