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"Do You Know What It Means To Miss New Orleans:" Individuals' Odds of Out-Migration Following Hurricane Katrina

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Disclaimer: The views expressed in this paper are those of the author and do not represent the official position of the U.S. Department of Health and Human Services.

This paper uses Hurricane Katrina as a case study to assess inequalities in disaster-specific, permanent out-migration. Most research on post-disaster migration utilizes data from developing countries, lacking application to the United States, or data that are either non-representative or incapable of robustly isolating disaster-specific migration relationships. This paper uses the American Community Survey (ACS) to robustly and representatively assess demographic, economic, and asset-based inequalities in post-disaster out-migration. ACS data provide comparison years for determining hurricane-specific relationships in a logistic regression model, essentially comparing disaster-specific migration to normal migration. Difference-in-differences estimation with comparison metropolitan areas detects relationships that may be causal and controls for non-disaster migration covariates specific to the disaster year. Demographic, economic, and asset-based inequalities are present, all of which have implications for disaster planning and response policy. Specifically, labor force attachment, being age 65 or older, and vehicle ownership are among the important predictors of disaster-specific migration outcomes.

Introduction

Hurricane Katrina, the costliest natural disaster in American history, resulted in the first mandatory evacuation of New Orleans, Louisiana. Issuing the order for evacuation on August 28, 2005, Mayor C. Ray Nagin said, "we are facing a storm that most of us have long feared" (Associated Press 2005). Indeed, the storm flooded more than 80 percent of the city (Schigoda 2011) and displaced nearly the entire population for weeks or months.

Although all New Orleanians were affected by the disaster, the effects likely differed across groups of people. Racial and ethnic minorities are more likely to move to neighborhoods experiencing environmental pollution and hazards (Crowder and Downey 2010). Moreover, inequalities in damage from hurricanes (Levy 2012; Fothergill and Peek 2004), death rates as a result of hurricanes (Sharkey 2007), and response and recovery efforts (Craemer 2010) have

been well documented. Now, a growing literature is assessing inequalities in the likelihood of residents returning to New Orleans versus permanently out-migrating. It is this question, inequities in post-disaster migration, that this paper explores.

Such inequalities are important from fairness and justice perspectives and through a public policy lens. The social costs of permanent displacement following Katrina include poor housing outcomes, poor access to health care, reduced income, and greater prevalence of mental illness (Hori and Schafer 2009). These negative displacement outcomes will increase demand for and enrollment in social services and negatively affect the budgets of the cities and states into which displaced individuals migrate. To date, research provides correlational evidence regarding populations more likely to out-migrate, but researchers are hampered by non-representative samples or the inability to isolate effects specific to the disaster.

This paper provides a more rigorous examination of post-Katrina migration than previous research, using comparison years to compare disaster-specific migration to normal migration and difference-in-differences estimation to detect relationships that may be causal and control for non-disaster migration covariates specific to the disaster year. As noted in later sections, migration for pre-Katrina residents is defined as not having returned to New Orleans when surveyed in the year following the hurricane, and there are multiple reasons that this definition of migration should yield results similar to perfectly-measured, permanent out-migration. Section 2 reviews the literature on disaster-related migration and Hurricane Katrina. Section 3 discusses the data and methodological approach. Section 4 presents results, and Section 5 concludes.

Literature

In their review of the literature on natural disasters and migration, Laczko and Aghazarm (2009) note that research (the authors cite Paul 2005, Smith and Ward 1998, and Parker et al 1997) has identified both tangible, direct effects and intangible, indirect effects of disasters. Whereas destruction and job loss would be tangible effects, migration would be an intangible effect. In this way, migration may be a secondary result of a natural disaster.

General migration theory can provide some insight into post-disaster migration. Speare (1974) highlights three fundamental migration theories: the cost-benefit model, the mover-stayer model, and the stress-response model. Sjaastad's cost-benefit model argues that individuals move if the present value of all future benefits of moving is greater than the costs of moving. This model incorporates the risk perception and economic calculation lenses Hunter (2005) identifies for examining post-disaster migration, but, as is well documented, individuals are often very bad at correctly comparing future benefits with present costs (Thaler and Sunstein 2009) – likely to be even more difficult after a disaster. Thus, the extent to which such a calculation correctly explains post-disaster migrations is likely limited.

The mover-stayer model posits that some individuals are movers and move frequently, whereas other individuals are stayers and do not move or consider moving often. Speare (1974) notes that although the mover-stayer model accurately reflects mobility data, it does not explain why some people move and others stay. Moreover, disasters are unique events in which individuals likely alter their behavior from the normal trends of the mover-stayer framework. Average migration rates can more than double after a disaster (Morrow-Jones and Morrow-Jones 1991). Again, it is unlikely that this theory correctly explains post-disaster migration.

Finally, Simon's stress-response model suggests that individuals are incapable of retaining perfect information (all benefits and costs) in moving decisions, and individuals instead respond to changes – stressors – that alter their needs and make current living arrangements unsuitable. In comparing disaster-induced migration with other types of migration, Morrow-Jones and Morrow-Jones (1991) note that there are multiple sources of stress in a disaster, including the loss of possessions, job concerns, and grief for family and friends. These stressors are similar to the direct, tangible effects of a disaster identified by Laczko and Aghazarm (2009). Most individuals respond to these stressors by trying to re-create and recover their standard of living from before the disaster. Often, this can involve a migration decision.

For migration decisions, stress matters through its relationship with residential satisfaction – a critical variable in all theories of migration (Speare 1974). Residents of a location are tied to that location in various ways: bonds with other residents, attachment to homes, employment, and community and local ties. The stronger and more fulfilling are these ties, the more satisfied and less likely to move are residents. Disasters alter these locational ties, and individuals must rely on internal and external resources to recover (Morrow-Jones and Morrow-Jones 1991). In planning for and recovering from a hurricane, the support individuals receive varies with demographic, economic, and community variables (Haines et al 1996). Thus, disparities likely exist in stress response, post-disaster residential satisfaction, and ultimately post-disaster migration.

Unfortunately, most research on post-disaster migration utilizes international disasters in developing countries to conduct case studies. Although useful for international development and aid, such studies have few applications to the United States. Post-disaster migration research is limited in the United States because, due to modern technology and development practices, most modern disasters affect relatively smaller populations and generate less-severe impacts than disasters in the developing world. Moreover, it is difficult to field promptly the necessary survey questions to assess a disaster's impact on migration, and migratory processes are more likely to be rapid and frequent in the United States than in many developing countries.

Due to Hurricane Katrina's scale and impact in New Orleans, the disaster presents a unique opportunity for researchers to assess its effects on migration. The hurricane not only prompted the mandatory evacuation of New Orleans, but it also flooded most of the city. Moreover, New Orleans is a substantial metropolitan area, affording the opportunity to leverage surveys already in the field when the disaster struck. For these reasons, research on post-Katrina out-migration is the best available source of information on disaster-related migration decisions.

It is worth noting that migration occurs at many times and can be defined in many ways. For instance, short-term evacuations before or immediately following the hurricane could be construed as migration, even if the evacuators return. Additionally, some individuals may evacuate before the storm and never return, thereby permanently out-migrating. Others may return temporarily after the storm, yet subsequently choose to out-migrate permanently. Given these possibilities, it is necessary to define migration with some precision. Because a permanent change in residence would seem to have the greatest impact on an individual's life chances, this research defines out-migration as an individual leaving New Orleans and not returning, regardless of whether or not the individual left before or after the storm.

Laczko and Aghazarm (2009) note that although slow-developing disasters, such as droughts with widespread crop loss, are more likely to cause permanent out-migration, the extent to which sudden disasters lead to temporary versus permanent migration is unclear. During Hurricane Katrina, the New Orleans population recovered fairly quickly, with most of the residents who would return doing so within four months (Fussell et al 2009). Thus, although Katrina was a sudden disaster, individuals not returning by the start of 2006 are likely to have permanent out-migration experiences. Moreover, even if these individuals return after two years or more, their experiences are likely similar enough to those of permanent out-migrants (e.g., establishing new social networks) that they should be counted as such. Therefore, unless otherwise noted, readers should presume the following definition of post-Katrina migration – individuals leaving New Orleans and not returning before the start of 2006. This research does not consider evacuation behavior, though this subject also is worthy of additional research (see Smith and McCarty 2009 for research on evacuations).

Researchers have examined migration from New Orleans following Hurricane Katrina, but current research is hampered by multiple limitations. Myers et al (2008) compare Gulf Coast parishes and counties before and after Hurricanes Katrina and Rita, but this approach precludes conclusions about individual migratory patterns due to the ecological fallacy. As Hunter (2005) suggests, micro-level approaches are superior to examine individual factors associated with migration, and other researchers use individual-level data to avoid this problem. Frey and Singer (2006) and Koerber (2006) compare summary statistics of movers before and after the hurricane. However, Stringfield (2009) notes that descriptive statistics do not capture the complexity of Gulf Coast migration. Other researchers use logistic or hazard models to estimate the odds of return for a representative cohort of Katrina evacuees (Fussell et al 2009; Stringfield 2009). Although representative, these researchers do not track migration before and after the hurricane, which would enable analysis of hurricane-specific relationships. Paxson and Rouse (2008) collect such data from low-income parents at two community colleges. Their data, however, are not representative of the New Orleans population. Landry et al (2007) highlight the importance of a good, representative sample with their divergent results from analyses of two smaller, non-representative population samples.

The lack of an ideal sample coupled with robust analytic methods does not invalidate the previous research on post-Katrina migration. However, it does mean the research cannot implicate the hurricane as the cause of any differences across populations in migration outcomes – as many studies would imply. Rather, this research is a good base for hypothesis development regarding post-disaster migration. Specifically, research indicates that post-disaster out-migration is associated with demographic, economic, and community variables. This paper will test many of these relationships,[1] which are detailed throughout the remainder of this section, using a representative data set containing cohorts before and after Katrina.

Demographics

Most evidence indicates that non-white residents are more likely than white residents to out-migrate, but the processes behind these disparities vary by race and ethnicity. For instance, although black residents were underrepresented after the hurricane when compared to New

[1] This research examines assets separately from economic variables because assets are less liquid than economic variables like income.

Orleans' pre-Katrina population (Frey and Singer 2006), the greater odds of out-migration for black residents likely results from economic and social covariates (Stringfield 2009). Vietnamese Americans are less likely than black Americans to out-migrate from the New Orleans East planning district, perhaps due to their social networks and greater optimism for the city's long-term prospects (Li et al 2010). Hispanics are more likely to out-migrate than non-Hispanics, when also controlling for race; the surge in New Orleans' Hispanic population after the disaster is the result of new immigrants (Stringfield 2009). Still, using only a minimal set of controls, Elliott and Pais (2006) find no racial associations with individuals' reported likelihoods of returning to New Orleans when surveyed one month after the hurricane, calling into question whether such relationships truly exist at all.

The evidence for an age-migration association is less clear. The median age of the New Orleans population increased by roughly 4 years following the hurricane (Frey and Singer 2006; Koerber 2006), but Elliott and Pais (2006) find that age is not associated with reported likelihood of return. Furthermore, although older individuals are slightly less likely to out-migrate, individuals older than 75 years of age do not migrate at rates significantly different from other individuals (Stringfield 2009). Children are a particularly interesting group. Whereas children are less likely to out-migrate following a hurricane (Stringfield 2009), being a parent is not associated with reported likelihood of return (Elliott and Pais 2006).

Large households, including homes with greater numbers of children, are associated with greater post-Katrina out-migration (Stringfield 2009; Paxson and Rouse 2008). Thus, it may be surprising that never-married or separated individuals are more likely to out-migrate in the four months following the hurricane than married or widowed individuals (Koerber 2006). Following the hurricane, New Orleans had a smaller incidence of female-headed households with children (Frey and Singer 2006). Living with family or friends also decreases the odds of out-migration (Paxson and Rouse 2008).

Demographic variables besides race, age, and family structure are not well-examined. Elliott and Pais (2006) and Stringfield (2009) suggest that gender is not associated with reported likelihood of return and actual out-migration, respectively, but additional research on this and other variables is necessary.

Economic characteristics

Research provides contradictory findings regarding the role of economic characteristics in out-migration. Elliott and Pais (2006) do not find a significant relationship between unemployment and reported likelihood of return. On the other hand, Stringfield (2009) concludes that being unemployed or not in the labor force is associated with greater out-migration, but working in a blue-collar job is not associated with a significant change in migration odds. Employment outcomes are the worst for individuals who had not returned to their pre-Katrina state of residence after a year (Zissimopoulos and Karoly 2010).

Across most research, poverty is related to greater out-migration. Parishes and counties in the Gulf Coast with greater poverty are associated with more out-migration following Hurricanes Katrina and Rita (Myers et al 2008), and the post-Katrina population of New Orleans includes a smaller incidence of poverty (Frey and Singer 2006). Residents earning less than $15,000 are more likely than any other group of earners to out-migrate, although individuals across the low-

income spectrum experience increased migration odds (Stringfield 2009). Oddly, using a continuous variable for income, Elliott and Pais (2006) find the opposite relationship; they conclude that greater income is associated with lower reported likelihood of return.

Assets

Homeownership plays an interesting role in post-disaster migration. Low-income homeowners are associated with greater reported likelihood of return than high-income homeowners, but both types of homeowners have greater reported likelihood of return than non-homeowners (Elliott and Pais 2006). Renters are associated with greater odds of out-migration (Paxson and Rouse 2008), and the prevalence of renters in New Orleans decreased after the hurricane (Frey and Singer 2006; Koerber 2006).

Housing damage also is an important predictor of out-migration, and some research indicates that a flooded home is the single-most important predictor of out-migration (Paxson and Rouse 2008). Parishes and counties across the Gulf Coast with greater damage rates for occupied housing units are associated with more out-migration following Hurricanes Katrina and Rita (Myers et al 2008). The damage-migration association is replicated at the individual level (Elliott and Pais 2006), although flooding depth does not add greater explanatory power than a dichotomous measure of home flooding (Paxson and Rouse 2008). Fussell et al (2009) find that the severity of housing damage, a slightly different measure than flooding depth, is a major factor associated with residents' decisions to out-migrate or return. Interestingly, as noted earlier, inequalities in flooding damage are found in both race and income (Levy 2012; Fothergill and Peek 2004).

Other assets, such as automobiles, also could play an important role in migration. Frey and Singer (2006) find a smaller prevalence of homes without any vehicles following the hurricane, but in general this relationship has not been explored adequately. New Orleans' significant carless population likely would experience greater difficulty in returning to the city given the transportation challenges associated with being carless; this could be especially true for carless individuals and families sheltering in New Orleans during the hurricane and evacuated by bus or plane to another city following the hurricane.

Community context

The role of social networks in migration is unclear. In reviewing the literature exploring post-Katrina migration, Fussell et al (2009) note that individuals living in poor neighborhoods or having inadequate social networks are more likely to out-migrate. Social networks – especially churches – foster place attachment, particularly amongst the Vietnamese American population (Li et al 2010). Falk et al (2006) speculate that this sense of place attachment grows the longer an individual resides in a location, perhaps spanning generations. However, Paxson and Rouse (2008) find that frequent church-goers and individuals rating high on a social support scale are more likely to out-migrate, concluding that these variables may be flooding covariates or associated with portable capital that eases the burden of moving.

Urban density is related to out-migration. Parishes and counties across the Gulf Coast with greater density of built environment – as measured by the number of commercial establishments and number of housing units per square mile – are associated with greater rates of out-migration

following Hurricanes Katrina and Rita (Myers et al 2008). Stringfield (2009) similarly notes that individuals living in metropolitan areas during Hurricane Katrina are more likely to out-migrate.

Data and Methods

This paper aims to isolate variables specifically related to post-disaster migration by controlling for – and comparing disaster-specific relationships to – normal migration patterns. The American Community Survey (ACS), an annual cross-sectional survey of the United States that is representative of metropolitan statistical areas (MSAs), provides a unique mechanism for controlling for and comparing to normal migration patterns. The ACS not only asks respondents where they currently reside, but it also asks them where they resided a year ago. Thus, it is possible to generate a representative population of New Orleans residents in the previous year and assess whether or not individuals migrated. For example, the 2005 wave of the ACS lists the 2004 place of residence for all respondents. All respondents listing the New Orleans MSA as their 2004 residence would represent the 2004 New Orleans population, and those individuals residing elsewhere in 2005 would be coded as out-migrants. ACS data are not longitudinal, so migration outcomes are based solely on a one-year period.

This definition of migration – exit from an MSA – excludes a significant number of moves that occur daily. In fact, moves within an MSA arguably are the more likely type of move for vulnerable populations. However, the ACS does not provide information on such moves, and therefore the model includes only out-migration from an MSA. This does have some advantages, as individuals leaving an MSA are almost certain to lose community ties and relationships with government services that existed at their prior residence. Such transitions can be especially problematic for vulnerable populations.

For information on independent variables, the ACS provides demographic, economic, and asset data at the individual level, but since this analysis focuses on the New Orleans MSA only, community context data are not available. Demographic variables include the number and age of an individual's children, whether or not the individual lives in a female-headed household, a measure of race and ethnicity, gender, age, marital status, and disability status. Economic variables include household income, education, labor force attachment (weeks worked), military status, poverty status, Supplemental Nutrition Assistance Program (SNAP) participation, Temporary Assistance for Needy Families (TANF) or Supplemental Security Income (SSI) participation, and TANF or SSI benefit value. Assets are measured as the number of vehicles a household possesses and whether the individual lives in a household owning its own home. Except for the asset variables, most independent variables are measures looking back over the twelve months prior to survey or are variables that rarely or never change, such as education, race, and number of children. Appendix A provides additional information on all variables.

To provide comparison years for isolating the hurricane-specific out-migration relationships, the data include five waves (2005-2009) of the ACS downloaded from the Integrated Public Use Microdata Series (Ruggles et al 2010). This samples New Orleans residents one year prior to Hurricane Katrina (2004) and three years after Hurricane Katrina (2006-2008). It is critical to compare post-Katrina migration to normal migration patterns, as opposed to modeling post-Katrina migration in isolation, because 39 percent of residents out-migrated in the non-Katrina years. Failure to account for such significant normal out-migration biases the estimates and incorrectly attributes significant normal migration to the hurricane.

The model excludes individuals under the age of 18, as recommended by Fussell et al (2009), because children's migratory processes likely differ in systematic ways across demographic, economic, and other variables from those of adults. It also excludes the group quarters population (367 individuals age 18 or older across all waves) because that population is notoriously difficult to sample and also likely varies in its migratory processes across the independent variables. Thus, the final sample includes 5,891 individuals, 2,124 of which are 2005 residents of New Orleans. The high share of 2005 residents reflects a decision by the Census Bureau to over-sample the post-Katrina population.

Interacting a Hurricane Katrina dummy variable – valued as one for the 2005 New Orleans population (data from the 2006 wave of the ACS) and zero at all other times – with the independent variables enables estimation of hurricane-specific relationships. To be sure, this is a very conservative method and sets a very high bar for detecting significant relationships. Some individuals sampled in the 2005 wave of the ACS – residents of New Orleans in 2004 – would have been sampled after Hurricane Katrina struck in late August. Thus, the model will miss some migrations that result from Katrina. Moreover, the model may include new migrants to New Orleans after Hurricane Katrina in 2005 – sampled in September through December of the 2006 wave – as pre-Katrina residents, further complicating the estimation. Still, the model does correctly identify roughly two-thirds of pre-Katrina residents (those sampled January-August in the 2006 wave). Additionally, to the extent that the model is biased by the incorrect classification of some residents, it is likely to be biased toward detecting insignificant disaster-specific relationships due to the presence of Katrina-induced migrants in the data for comparison years. Estimation would be more problematic had the hurricane struck precisely during the middle of the calendar year.

An additional concern with the proposed migration estimation would be that residents did not return quickly enough to New Orleans after Hurricane Katrina to adequately capture disaster-related out-migration with the presently specified dummy variable. However, most of the residents that returned to New Orleans returned within the first four months after Katrina – thus returning before 2006 – and returns stabilized in less than a year (Fussell et al 2009). Moreover, to the extent that residents remained away from New Orleans for longer than a year, as did most individuals that did not return within four to five months, their experience is likely to be similar enough to moving that it should be counted as such. If they had children, individuals needed to find new schools, and if they received government services, individuals needed to find new service centers.

It is worth noting that, assuming New Orleans was a stable population with unchanging demographic-, economic-, and asset-specific migration probabilities before Hurricane Katrina, any changes between the before-hurricane and after-hurricane populations could be attributed to the hurricane. Such an assumption is highly tenuous. Moreover, such an analysis – similar to Myers et al (2008) – would detect at-best correlational relationships with migration, and any individual-level conclusions would risk violating the ecological fallacy. Instead, to find relationships robust to potential covariates and more likely to be significant, individual-level modeling is necessary. Thus, the model below is the best estimation possible given the limitations of ACS data and the data and methodological requirements for sound estimation of disaster-specific relationships:

$$Migration_i = \mu + K_t + D_i + K_t * D_i + E_i + K_t * E_i + A_i + K_t * A_i + \varepsilon_i$$

For ease of interpretation of the coefficients as odds ratios – and ultimate transformation into probabilities – this paper models individual migration using a logistic regression. Migration is explained by a Hurricane Katrina dummy variable, the demographic, economic, and asset independent variables, hurricane-specific relationships with the independent variables, and an individual-specific error term. Specifically, K represents the Hurricane Katrina dummy variable, D represents a vector of demographic variables, E represents a vector of economic variables, and A represents a vector of asset variables.

Finally, difference-in-differences modeling using comparison MSAs controls for non-disaster migration covariates specific to the disaster year and highlights relationships that may be causal. This modeling provides an even more stringent threshold for detecting significant relationships, and results appear at the end of the next section.

Results

Table 1 presents the results from the logistic analysis as probabilities calculated from odds ratios. The probabilities represent the percentage point change above or below a 50 percent probability of out-migration given a one unit change in the dependent variable. For instance, a resident of New Orleans in 2005 – when the hurricane dummy variable takes a value of one – experiences a 38 percent increase in the probability of out-migration above even odds (i.e., an 88 percent probability of out-migration). The probabilities are calculated as:

$$\text{Probability change} = \frac{\text{odds ratio}}{1+\text{odds ratio}} - 0.5$$

The odds ratios from which the probabilities in Table 1 are calculated appear in Appendix B.

Table 1. Logistic Regression Results (as probabilities above or below 50%)

	Normal Probability		Katrina-Interaction Probability	
Disaster dummy			37.58%	***
Demographic Variables				
Female-headed household	-3.31%		18.30%	*
Number of children	0.11%		-1.71%	
Child's age (# yrs. under 18)	-0.17%		0.79%	†
Female	-2.46%		-5.58%	
Married	4.42%		-3.76%	
Multiracial/other	6.49%		6.71%	
Asian/Pacific Islander	0.05%		14.71%	
AIAN	25.89%		29.88%	
Black	2.14%		0.11%	
Hispanic	3.83%		-2.72%	
Elderly	7.63%	†	-13.47%	*
Disability	-5.59%		7.01%	
Economic Variables				
Income (per $1,000)	0.07%	**	-0.07%	
Poverty	0.02%	*	-0.06%	***
Master's degree or greater	9.99%	*	5.74%	
Bachelor's degree	8.62%	*	1.08%	
Two years of college	13.75%	*	-3.21%	

High-school diploma	-2.65%		-3.43%	
No diploma	-6.80%	†	4.91%	
Self employed	4.05%		-11.40%	
Worked 40-47 weeks	22.33%	***	-22.19%	**
Worked 27-39 weeks	22.31%	***	-3.33%	
Worked 1-26 weeks	21.52%	***	-7.70%	
Did not work in last year	13.96%	***	-2.55%	
Veteran	8.34%	*	3.62%	
Training for Reserves/Guard	10.57%		-25.76%	†
Active duty military	38.46%	**	-24.58%	
SNAP receipt	13.22%	***	-0.97%	
TANF/SSI receipt	25.96%	**	-5.66%	
TANF/SSI value (per $1,000)	-7.57%	**	4.47%	
Asset Variables [2]				
Homeowner	-13.65%	***	14.37%	**
Vehicles	1.50%		-7.73%	***
F (65, 5826)	7.39			
Percent correctly classified [3]	65.68%			

† = p<.1, * p<.05, ** p<.01, *** p<.001

The model performs reasonably well, correctly predicting roughly two-thirds (65.7 %) of all migration decisions. It also correctly predicts two-thirds (65.1 %) of post-Katrina migrations for the 2005 New Orleans residents. It is worth noting that a model including only 2006 survey data – thus excluding comparison years and the Katrina dummy variable and interactions – predicts the same migration outcomes for each 2005 New Orleans resident. However, by adding comparison years and a Katrina interaction term, the specification presented in this paper isolates disaster-specific migration patterns while losing no predictive power.

Not surprisingly, residents of New Orleans in 2005 are much more likely to out-migrate. Holding all other variables constant, residing in New Orleans in 2005 is associated with an 88 percent probability of out-migrating the following year. Although this does not imply that 88 percent of pre-Katrina residents out-migrated, it does demonstrate that the hurricane played a substantial role in migration. Roughly 59 percent of 2005 residents had out-migrated when surveyed in 2006, whereas the average out-migration rate was 39 percent for all other years. Clearly, the hurricane induced out-migration, and as is suggested in previous research, it is unlikely the hurricane affected all populations in the same way.

The next three subsections first discuss the model's results for normal migration patterns and then discuss any disaster-specific migration relationships for each of the demographic, economic, and asset variables included in the analysis. As a check to ensure the inclusion of data for 2006 and 2007 residents does not bias the estimates by including individuals in the comparison years' population whose migration propensities systematically differ from the pre-Katrina population, the model is re-estimated using data only from pre-Katrina years (2004 and 2005) and 2008 (by which time migration had long-since stabilized). Nearly all significant disaster-migration relationships remained significant, with few newly significant relationships appearing.

[2] Assets are measured at the time of survey. For example, for 2005 residents, homeownership is measured when surveyed in 2006.

[3] Without survey-setting the data. Option is not available in Stata postestimation following the *svyset* command.

Demographic Variables

Table 1 indicates that few demographic variables are associated with normal out-migration from a metropolitan area. American Indians and Alaskan natives (AIAN) have greater odds of out-migrating than do white individuals, and the elderly are more likely to out-migrate than non-elderly. However, gender, gender of household head, other races or ethnicities, marital status, age and number of children, and disability status are unassociated with normal migration decisions. This is not to say that these variables do not play a role in individuals' or households' decisions to move. In fact, the literature suggests that racial minorities and poor individuals are less likely to move homes (South and Deane 1993). Rather, this analysis focuses exclusively on out-migration from a specific metropolitan area.

The sparse association between demographic variables and out-migration is largely true for the post-disaster context as well. Individuals with younger children are more likely to out-migrate after a disaster than during normal contexts, as are individuals residing in female-headed households. Elderly individuals are less likely to out-migrate following a disaster. Still, variables like race or ethnicity, gender, marital status, and disability status are not associated differently with out-migration during a disaster – a surprising finding, particularly given the literature on race and post-disaster migration. Perhaps, racial inequalities in out-migration highlighted by the literature operate through some of the economic and asset independent variables controlled for in the analysis.

The different directions of the significant relationships between post-disaster out-migration and vulnerable populations are worth exploring. Individuals with young children and individuals living in female-headed households with kids but no spouse present are more likely to out-migrate after a hurricane, whereas elderly individuals are less likely to out-migrate after a hurricane. Attachment of children to new schools – Hurricane Katrina struck just as the school year was starting – may explain why individuals with children are more likely to out-migrate. It took months for New Orleans to re-open its first schools after Hurricane Katrina, and many schools remained closed for years to come. The explanation for the lower odds of out-migration for elderly individuals is less clear. Mobility concerns, though possibly a factor in pre-hurricane evacuation, do not seem to explain the lower odds because nearly all residents eventually were evacuated from New Orleans, thus implying that limited mobility would increase, rather than decrease, the odds of permanent out-migration. Moreover, disabled individuals, many of whom share similar mobility concerns, do not out-migrate at significantly different rates following a hurricane. Strong community ties developed over a lifetime could offer an alternative explanation, but additional research is necessary.

Economic Variables

Economic variables play a very significant role in normal migration decisions, as indicated by the results in Table 1. Income is associated positively with normal out-migration, although being in poverty also is associated positively – albeit at a smaller magnitude – with out-migration, suggesting possible non-linearity in the income-migration relationship. SNAP, TANF, and SSI receipt, proxies for being low-income, also are associated positively with normal out-migration, although as the value of TANF/SSI benefits rises migration odds decrease. Individuals with higher levels of education are more likely to out-migrate than individuals with lower levels of education. Individuals who work fewer weeks in the past year are more likely to out-migrate.

Perhaps due to the nature of their employment or former employment, active-duty military employees and veterans are more likely to out-migrate than individuals employed in other fields.

For the most part, with a few notable exceptions, economic variables are associated similarly with out-migration following a hurricane and normal contexts. SNAP, TANF, and SSI receipt, as well as income, are insignificant predictors of disaster-specific migration associations, and poverty is only marginally significant in the negative direction, counteracting its normal association. Education and employment are mostly insignificant, although individuals who worked 40-47 weeks in the past year are less likely to out-migrate following a disaster. In fact, these individuals are just as unlikely to out-migrate following a hurricane as individuals employed 48 or more weeks in the past year, perhaps because the attachment to a job offering employment for most of the year becomes stronger following a disaster. This is not to say that unemployment is unrelated to post-disaster migration odds. Rather, the unemployed out-migrate at greater rates normally, and although disasters do not affect them differently than individuals employed full-time, the normal increase in out-migration odds persists to increase their post-disaster migration odds. Individuals training for the Reserves or National Guard are much less likely to out-migrate following a disaster, potentially the result of response and recovery duties.

Asset-Related Variables

Asset variables also play a significant role in normal migration decisions (see Table 1). Although the number of vehicles a household possesses is insignificant, homeownership substantially reduces the odds of normal out-migration. Helderman et al (2006) review the evidence of this association, suggesting that location-specific ties or advantages, as well as the higher transaction costs of moving from an owner-occupied home, result in the decreased odds of migration for homeowners.

Assets are critically important during post-disaster migration decisions as well. Homeownership in the year following a disaster is associated positively with out-migration. This relationship roughly cancels out the negative relationship between homeownership and out-migration during normal circumstances. Thus, it is possible that homeownership status barely affects an individual's decision of whether or not to out-migrate following a disaster.

The number of vehicles a household owns is related negatively to post-disaster out-migration; that is, the more vehicles (maximum of six) a household owns, the less likely its individuals are to out-migrate. When examined for potential non-linearity in the relationship to be modeled as a spline, the linearity of the vehicle-migration relationship persists. Berube and Raphael (2005) note that racial minorities and vulnerable populations, like children, the elderly, and the poor, were particularly likely to live in households without access to a car in pre-Katrina New Orleans. Perhaps, vehicle access explains the greater rates of out-migration for these populations. More than 100,000 individuals lacked the means to evacuate New Orleans, but the city had no organized plan to evacuate them (Brinkley 2006). Ultimately, all individuals remaining after the hurricane were evacuated on buses or planes to cities across the South. Thus, those without cars, although they were more likely to remain in the city during Hurricane Katrina, were less able to return once evacuated. Vehicle access could be the mechanism by which this relationship operates, or it could reflect greater or lesser access to assets to finance return.

Differences-in-Differences Analysis

To further eliminate the potential for bias of non-disaster migration covariates specific to the disaster year and better detect relationships that may be causal, difference-in-differences estimates compare New Orleans disaster-specific migration with out-migration from Charleston and Savannah over the same period. Charleston and Savannah provide reasonable bases for comparison because both are coastal cities with tourism-based economies and fairly similar demographics, but they did not experience a major disaster from 2005 to 2009. Charleston did experience minor impacts from Hurricanes Charley and Gaston in 2004, but any effects on migration would be negligible.

Specifically, as the equation below describes, the difference-in-differences model interacts all explanatory variables (X) with a Hurricane Katrina year dummy (K), a New Orleans dummy (N), and both the Katrina year and New Orleans dummies simultaneously. Non-interacted explanatory variables control for the variables' relationships with out-migration generally, the Katrina year dummy controls for time-sensitive relationships, and the New Orleans dummy controls for geographic-sensitive relationships. The coefficients of the explanatory variables interacted with both dummies simultaneously provides the best-estimate of disaster-caused migration. The difference-in-differences model is:

$$Migration_i = \mu + X_i + K_t + N_i + (K_t * X_i) + (N_i * X_i) + (N_i * K_t * X_i) + \varepsilon_i$$

Table 2 presents the difference-in-differences estimates of a disaster's relationship with migration (first column) compared to the Katrina-interaction results from Table 1 (second column). Both sets of probabilities can be interpreted as the percentage point change above or below a 50 percent probability given a one unit change in the dependent variable. The simultaneous interactions of two variables (multiracial/other and bachelor's degree) that were insignificant in the normal logistic regression with the Katrina-year and New Orleans dummies are omitted from the difference-in-differences model due to multicollinearity. Complete difference-in-differences results appear in Appendix C.

Table 2. Comparing Difference-in-Differences Results with Katrina-Interaction Results (as probabilities above or below 50%)

	Difference-in-Differences	**Katrina Interaction**	
Disaster dummy		37.58%	***
NOLA dummy			
Demographic Variables			
Female-headed household	11.71%	18.30%	*
Number of children	3.24%	-1.71%	
Child's age (# yrs. under 18)	0.41%	0.79%	†
Female	1.94%	-5.58%	
Married	-1.15%	-3.76%	
Multiracial/other	omitted	6.71%	
Asian/Pacific Islander	11.08%	14.71%	
AIAN	-29.45%	29.88%	
Black	1.63%	0.11%	
Hispanic	17.03%	-2.72%	

Elderly	-22.87%	*	-13.47%	*
Disability	20.26%	*	7.01%	
Economic Variables				
Income (per $1,000)	-0.01%	***	-0.07%	
Poverty	30.31%	***	-0.06%	***
Master's degree or greater	21.29%	*	5.74%	
Bachelor's degree	omitted		1.08%	
Two years of college	7.78%		-3.21%	
High-school diploma	13.88%	†	-3.43%	
No diploma	19.20%	*	4.91%	
Self employed	1.16%		-11.40%	
Worked 40-47 weeks	-11.05%		-22.19%	**
Worked 27-39 weeks	4.95%		-3.33%	
Worked 1-26 weeks	-12.57%		-7.70%	
Did not work in last year	-6.55%		-2.55%	
Veteran	18.41%	†	3.62%	
Training for Reserves/Guard	-30.26%		-25.76%	†
Active duty military	-6.50%		-24.58%	
SNAP receipt	3.90%		-0.97%	
TANF/SSI receipt	10.71%		-5.66%	
TANF/SSI value (per $1,000)	-5.67%		4.47%	
Asset Variables				
Homeowner	17.46%	**	14.37%	**
Vehicles	-11.40%	***	-7.73%	***

† = p<.1, * p<.05, ** p<.01, *** p<.001

The primary demographic correlates with post-disaster out-migration – being age 65 or older and living in a female-headed household – maintain their relationships in the difference-in-differences analysis, although living in a female-headed household loses its significance. None of the other female-headed household variable interactions are significant in the difference-in-differences model, indicating that the variable is likely correlated with migration rather than being causally related. In addition, the difference-in-differences analysis provides some evidence that individuals with disabilities may be more likely to out-migrate following a disaster.

The difference-in-differences analysis tempers any conclusions about a disaster-specific relationship between economic variables and out-migration. Although the relationships of labor force attachment and National Guard/Reserves training with migration continue in the same direction at roughly the same magnitude, both lose their significance. Unlike the results from the normal logistic model, difference-in-differences analysis suggests that being a veteran and being at either end of the educational spectrum are associated significantly with post-disaster out-migration. Perhaps the most interesting change from the normal logistic analysis to the difference-in-differences analysis is the relationship between poverty and migration. The former model suggests that poverty is weakly, but negatively, related to out-migration, whereas the latter model isolates a strongly positive relationship between poverty and post-disaster migration. This results from the inclusion of comparison cities, which highlight a generally negative – but statistically indistinguishable from zero – relationship between poverty and migration, as well as a stronger, significantly negative relationship for migrants in 2006. Compared against these relationships, the poverty-migration relationship induced by Hurricane Katrina becomes clearer.

Difference-in-differences modeling confirms the relationship between assets and out-migration, indicating that both home and vehicle ownership are strongly, possibly causally, related to post-

disaster migration. Both relationships strengthen in magnitude from the normal logistic model to the difference-in-differences model.

Conclusion

The analysis presented here uses Hurricane Katrina to highlight key variables in post-disaster migration decisions that are unique to disasters. It is not meant to diminish other variables that are associated with normal migration decisions but do not have significant disaster-specific impacts. To be sure, these normal migration patterns still influence post-disaster decisions; rather, this analysis also isolates the influences on migration that are specific to a disaster – in a sense the migration effects of a disaster with the normal, baseline relationships removed. The best example of why both baseline relationships and disaster-specific relationships matter is homeownership. Although the results indicate that homeownership increases odds of post-disaster out-migration, its normal relationship with out-migration is negative; these essentially cancel each other out and imply that homeowners out-migrate at rates similar to non-homeowners following a disaster.

This research concludes that individuals with the means to return home after evacuating for a disaster are more likely to return and thus less likely to out-migrate. Owning vehicles is a major variable that promotes returning home and reduces out-migration. Having a job also may promote return. The job disincentive for out-migration could operate through many mechanisms: increased transaction costs for out-migration, available income to finance a return, assistance from an employer to finance a return, or perhaps another mechanism. That individuals working 40-47 weeks a year are just as unlikely to out-migrate as individuals working 48 or more weeks a year after a hurricane indicates that attachment to employment – even if not quite full-time, full-year – strengthens following a disaster. The possible relationship between poverty and greater post-disaster out-migration further underscores individuals' needs for resources to reduce migration odds.

Female-headed households with kids and without a spouse present are much more likely to out-migrate. Perhaps, this relationship exists due to some combination of the attachment of children to new schools, the delay of New Orleans in opening schools after the hurricane, and the difficulties and resource limitations of moving children as a single parent. The significance of this relationship does not persist in the difference-in-differences analysis, suggesting that it may be correlational rather than causal. Additional research on female-headed households is necessary to confirm, clarify, or amend these hypotheses.

The elderly are much less likely to out-migrate following a disaster. This would not seem to be the result of mobility concerns because all residents ultimately were evacuated, and individuals with disabilities – another population that could have mobility concerns – may be more likely to out-migrate. Perhaps the reduced migration odds for the elderly are the result of stronger social networks that remain in place after a disaster. Again, additional research would be beneficial.

Besides the few differences described above, post-disaster migration is not much different than normal migration. This does not mean that no other important or policy-relevant conclusions can be made; similarities in migration patterns matter as well. Unemployed or under-employed individuals normally have greater odds of out-migration, and the same is true after a disaster. In the New Orleans MSA, the annual unemployment rate declined from 4.9 in 2004 to 4.3 in 2006

and 3.5 in 2007 (Bureau of Labor Statistics 2011). This, along with the results presented above, suggests a combination of greater rates of out-migration of the unemployed or underemployed following the hurricane and creation of recovery-based jobs for individuals remaining after the hurricane. Thus, new employment assistance efforts could be targeted to the individuals out-migrating, as opposed to those remaining after a hurricane.

The similar rates of post-disaster out-migration of homeowners and renters suggest that recovery policies can address both groups. The Road Home Program, as well as other programs, provided substantial assistance to homeowners, with the Road Home Program dispersing over $8.8 billion in funding assistance. Statutory authority did not exist to provide adequate recovery assistance to ensure the necessary stock of rental housing, and the U.S. Senate's Ad Hoc Subcommittee on Disaster Recovery's first recommendation is to improve recovery policies related to rental stock and rental assistance (U.S. Senate 2009). This is an important finding, as renters experienced rapid increases in rent – 39 percent in the year following the hurricane – posing a severe hardship for many individuals (Liu et al 2006).

Ultimately, the similarity between disaster and normal migration is quite remarkable. Although more people migrate following a disaster, there are relatively few differences in the demographic and economic characteristics of those people. Some of the differences that do exist, such as those for female-headed households and the number of vehicles a household possesses, possibly are explained by variables external to the hurricane, such as the start of the school year and the mandatory evacuation. Other differences between normal and disaster migration patterns, like those for employment status and the elderly, could result from the disaster.

New Orleans and Hurricane Katrina provide an interesting, albeit extreme, example of post-disaster migration patterns. This analysis demonstrates that many of the differences in post-disaster migration are present in normal migration patterns as well, and relatively few differences are associated specifically with the disaster event. Additional research on other hurricanes and other types of disasters is necessary to validate these results across different geographies, populations, and hazards. Still, these results provide a good basis for predicting migration after future major hurricanes.

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Appendix A. Description of Variables

Disaster. Disaster is a dummy variable coded as one if the ACS respondent completed the survey in 2006, thus having resided in New Orleans MSA in 2005.

Demographic Variables

Female-headed household. This dummy variable is coded as one if the individual resides in a household with a female head who does not have a spouse present but does have children under age 18.

Number of children. The number of own children an individual has residing in the individual's household.

Child's age. This variable measures the age of an individual's youngest own-child residing in the household. It is operationalized as the number of years younger than 19 years old that child is, essentially making it a measure of 'youngness.'

Gender. Gender is a dummy variable coded as one if the individual identifies as female.

Married. Married is a dummy variable coded as one if the individual is married with a spouse present in the household.

Race/ethnicity. Race/ethnicity is operationalized as a group of dummy variables with non-Hispanic white as the base in the regression analysis. Other categories are non-Hispanic black, Hispanic, non-Hispanic American Indian-Alaskan Native (AIAN), non-Hispanic Asian-Pacific Islander, and multi-racial/other. Since race and ethnicity are determined by separate questions on the ACS, some individuals are re-coded as Hispanic only. This includes individuals identifying as Hispanic, as well as the following race identifications: white (216 individuals), black (26), AIAN (5), other (124), white/other write in (6), and black/other write in (1). Ten individuals identifying as Hispanic also selected multi-racial/other race responses that could not easily be classified as Hispanic, and these individuals are multi-coded as both multi-racial/other and Hispanic.

Elderly. Elderly is a dummy variable coded as one if the individual reports being 65 years of age or older.

Disability. Disability is a dummy variable coded as one if the individual reports cognitive, ambulatory, independent living, self care, vision, or hearing difficulty.

Economic Variables

Income. Income is the CPI-adjusted total household income reported by the respondent. After regression analysis, odds ratios are multiplied by 1,000 to make them more interpretable.

Poverty. Poverty is a dummy variable coded as one if the individual resides in a household whose income falls below the poverty threshold.

Education. Education is operationalized as a group of dummy variables with some college (but no 2-year or 4-year degree) as the base in the regression analysis. Other categories are Master's degree or greater, Bachelor's degree, two years of college, high school diploma or GED, and no diploma.

Self-employed. Self-employed is a dummy variable coded as one if the individual reports being self-employed.

Weeks worked. Weeks worked in the past year is operationalized as a group of dummy variables with 48-52 weeks worked as the base in the regression analysis. Other categories include 40-47 weeks worked, 27-39 weeks worked, 1-26 weeks worked, and no weeks worked.

Military service. Military service is operationalized as a group of dummy variables with no military service as the base in the regression analysis. Other categories include non-active-duty veteran, training for the Reserves or National Guard, and active-duty military.

SNAP receipt. SNAP receipt is a dummy variable coded as one if the individual reports residing in a household currently receiving SNAP.

TANF/SSI receipt. TANF/SSI receipt is a dummy variable coded as one if the individual reports receiving any income in the past year that would be commonly referred to as welfare (SSI, TANF, General Assistance).

TANF/SSI value. This variable is the CPI-adjusted value of any income the individual reports in the past year that would be commonly referred to as welfare (SSI, TANF, General Assistance). After regression analysis, odds ratios are multiplied by 1,000 to make them more interpretable.

Asset Variables

Homeowner. Homeownership is a dummy variable coded as one if the individual resides in a household that owns its home free and clear or owns it with a mortgage or loan.

Vehicles. This variable is a count of the total number of vehicles reported available at home for use by a household. It is top-coded at six.

Appendix B. Results as Odds Ratios

	Normal Probability			Katrina-Specific Probability		
Disaster dummy				7.050	[2.135]	***
Demographic Variables						
Female-headed household	0.876	[0.188]		2.155	[0.793]	*
Number of children	1.005	[0.068]		0.934	[0.107]	
Child's age (# yrs. under 18)	0.993	[0.011]		1.032	[0.020]	†
Female	0.906	[0.090]		0.799	[0.127]	
Married	1.194	[0.135]		0.860	[0.154]	
Multiracial/other	1.298	[0.454]		1.310	[0.765]	
Asian/Pacific Islander	1.002	[0.291]		1.834	[0.858]	
AIAN	3.148	[2.093]		3.970	[5.809]	
Black	1.090	[0.118]		1.004	[0.169]	
Hispanic	1.166	[0.213]		0.897	[0.279]	
Elderly	1.360	[0.221]	†	0.576	[0.146]	*
Disability	0.799	[0.110]		1.326	[0.281]	
Economic Variables						
Income (per $1,000)	1.000003	[0.000]	**	0.999997	[0.000]	
Poverty	1.001	[0.000]	*	0.998	[0.001]	***
Master's degree or greater	1.499	[0.266]	*	1.259	[0.360]	
Bachelor's degree	1.416	[0.213]	*	1.044	[0.255]	
Two years of college	1.758	[0.394]	*	0.879	[0.299]	
High-school diploma	0.900	[0.111]		0.872	[0.175]	
No diploma	0.760	[0.111]	†	1.218	[0.297]	
Self employed	1.176	[0.201]		0.629	[0.194]	
Worked 40-47 weeks	2.614	[0.436]	***	0.385	[0.111]	**
Worked 27-39 weeks	2.611	[0.478]	***	0.875	[0.251]	
Worked 1-26 weeks	2.511	[0.372]	***	0.733	[0.170]	
Did not work in last year	1.775	[0.243]	***	0.903	[0.205]	
Veteran	1.400	[0.226]	*	1.156	[0.306]	
Training for Reserves/Guard	1.536	[0.602]		0.320	[0.222]	†
Active duty military	7.664	[5.303]	**	0.341	[0.387]	
SNAP receipt	1.719	[0.196]	***	0.962	[0.161]	
TANF/SSI receipt	3.159	[1.120]	**	0.797	[0.398]	
TANF/SSI value (per $1,000)	0.999697	[0.000]	**	1.000179	[0.000]	
Asset Variables						
Homeowner	0.571	[0.060]	***	1.807	[0.320]	**
Vehicles	1.062	[0.057]		0.732	[0.063]	***

† = p<.1, * p<.05, ** p<.01, *** p<.001

Appendix C. Full Results from Difference-in-Differences Regression Model
(as probabilities above or below 50%)

	Normal Probability		2006 Migrant-Specific		NOLA Specific		Katrina Specific	
Disaster dummy			15.45%	**				
NOLA dummy					-1.62%			
Demographic Variables								
Female-headed household	-3.19%		-2.86%		4.29%		11.71%	
Number of children	0.83%		-4.00%		-0.97%		3.24%	
Child's age (# yrs. under 18)	-0.12%		0.69%		-0.21%		0.41%	
Female	4.09%		-6.66%		-8.98%	*	1.94%	
Married	3.03%		-6.07%		4.65%		-1.15%	
Multiracial/other	5.16%		-5.79%		18.02%		omitted	
Asian/Pacific Islander	16.41%	*	6.37%		-19.26%	†	11.08%	
AIAN	-10.24%		44.56%	*	29.69%		-29.45%	
Black	-4.58%		1.75%		5.21%		1.63%	
Hispanic	17.67%	**	-13.94%		-16.26%	*	17.03%	
Elderly	-17.43%	**	13.31%		21.37%	**	-22.87%	*
Disability	1.26%		-11.80%		-9.41%	†	20.26%	*
Economic Variables								
Income (per $1,000)	0.00%	***	0.00%	*	0.00%		-0.01%	***
Poverty	-4.72%		-15.95%	*	4.18%		30.31%	***
Master's degree or greater	7.88%	†	-18.57%	*	4.34%		21.29%	*
Bachelor's degree	8.83%	***	-17.46%	**	19.75%	**	omitted	
Two years of college	1.67%		-9.78%		13.45%	†	7.78%	
High-school diploma	-1.30%		-13.51%	*	-3.22%		13.88%	†
No diploma	-3.84%		-9.40%		-4.61%		19.20%	*
Self employed	-14.69%	**	-10.34%		17.42%	**	1.16%	
Worked 40-47 weeks	18.63%	***	-7.69%		3.88%		-11.05%	
Worked 27-39 weeks	20.85%	***	-2.52%		-0.24%		4.95%	
Worked 1-26 weeks	16.84%	***	10.82%		2.69%		-12.57%	
Did not work in last year	12.10%	**	7.71%		-0.01%		-6.55%	
Veteran	13.47%	**	-11.04%		-6.22%		18.41%	†
Training for Reserves/Guard	-1.03%		8.20%		13.85%		-30.26%	
Active duty military	26.75%	***	-6.05%		20.02%		-6.50%	
SNAP receipt	-1.38%		-3.76%		13.27%	*	3.90%	
TANF/SSI receipt	35.73%	†	-24.90%		-15.88%		10.71%	
TANF/SSI value (per $1,000)	-29.10%		12.00%		21.62%		-5.67%	
Asset Variables								
Homeowner	6.07%	*	-7.10%		-15.94%	***	17.46%	**
Vehicles	0.18%		3.92%	†	2.76%		-11.40%	***

† = p<.1, * p<.05, ** p<.01, *** p<.001