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THE KATRINA EFFECT:  
WAS THERE A BRIGHT SIDE TO THE EVACUATION OF GREATER NEW ORLEANS?

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Working Paper 13022  
<http://www.nber.org/papers/w13022>

NATIONAL BUREAU OF ECONOMIC RESEARCH  
1050 Massachusetts Avenue  
Cambridge, MA 02138  
April 2007

I thank Elizabeth Ananat, Charles Clotfelter, and seminar participants at the University of California - Berkeley and McGill University for helpful comments on an earlier draft. Mia Bonarski provided exceptional research assistance. Any opinions expressed in this paper are those of the author and not any affiliated organization. Any and all errors can be attributed directly to the author. The views expressed herein are those of the author(s) and do not necessarily reflect the views of the National Bureau of Economic Research.

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The Katrina Effect: Was There a Bright Side to the Evacuation of Greater New Orleans?

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NBER Working Paper No. 13022

April 2007

JEL No. I38,J22,R23

### **ABSTRACT**

In the presence of moving costs, individuals may remain in a region even when they expect to attain a higher standard of living elsewhere. When a natural disaster or other exogenous shock forces individuals to move, the net impact on living standards could be positive or negative. This paper uses longitudinal data from Current Population Surveys conducted between 2004 and 2006 to estimate the net impact of Hurricane Katrina-related evacuation on various indicators of well-being. While evacuees who have returned to the affected region show evidence of returning to normalcy in terms of labor supply and earnings, those who persisted in other locations exhibit large and persistent gaps, even relative to the poor outcomes of New Orleans-area residents prior to the storm. Evacuee outcomes show few if any relationships with host community characteristics, including unemployment and growth rates. The impact of evacuation on total income was blunted to some extent by government transfer payments and by self-employment activities. Overall, there is little evidence to support the notion that poor underemployed residents of the New Orleans area were disadvantaged by their location in a relatively depressed region.

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*“[One evacuee family's] journey illustrates one surprising benefit from an otherwise terrible storm: the exodus took low-income families to areas richer in opportunity.”*

-- Jason DeParle, “Katrina's Tide Carries Many to Hopeful Shores.” New York Times, April 23 2006, page A1.

## **I. Introduction**

For several decades, economists and other social scientists have hypothesized that residing in an economically depressed neighborhood or region might have deleterious effects on an individual's socioeconomic outcomes. Several causal mechanisms have been cited to support such a hypothesis. Poor areas may have relatively limited access to areas of job growth, underdeveloped formal or informal employment networks, or might breed disadvantage by exposing youth to fewer educational resources (Kain 1968; Gephardt 1997). While these hypothesized mechanisms have intuitive appeal, recent experimental and quasi-experimental evidence, including a number of studies derived from the Federal Moving to Opportunity demonstration program (MTO), suggests that the causal impact of residence in an environment of concentrated poverty is minimal in many cases (Oreopoulos 2003; Jacob 2004; Kling et al. 2004; Turney et al. 2006).

One limitation of this recent literature is that it generally studies the impact of moving across neighborhoods within the same metropolitan area. If labor markets are truly integrated throughout a metropolitan area, and transportation within a metropolitan area is relatively inexpensive, then one would expect such neighborhood moves to be of little consequence for employment-related outcomes. The MTO program and associated quasi-experiments offer comparatively little evidence regarding the potential impact of a more ambitious program for removing individuals from unfavorable labor market settings: moving across, rather than within metropolitan areas.

Hurricane Katrina, which made landfall on the Gulf Coast of the United States on August 30, 2005, can be thought of as creating a form of mobility experiment – albeit one accompanied by a devastating shock initial shock to participants' assets and well-being. It caused ruinous flooding in the city of New Orleans, Louisiana, an economically declining metropolis, and wreaked considerable destruction on the similarly disadvantaged Gulf Coast of Mississippi.<sup>1</sup> Hundreds of thousands of residents of the region evacuated as the storm approached, and thousands more left their homes in its aftermath. As of July 2006, the estimated population of Louisiana had declined by more than 200,000 relative to the previous year – an underestimate of the impact on the area surrounding New Orleans since many evacuees relocated in other parts of the state (Census Bureau 2006). The storm and its aftermath raised a heated national debate regarding the government's responsibilities towards disaster victims, not only in terms of insuring against financial losses but in terms of providing the basic necessities of life.

In the aftermath of the storm, many observers have gone on record in the popular press with opinions that many former New Orleans-area residents will find better lives for themselves elsewhere, an argument fully consistent with the view that residence in a depressed area negatively influences outcomes.<sup>2</sup> Anecdotes regarding individual evacuees making better lives for themselves in other cities, such as the one printed on the preceding page, are easily found. It is unclear, however, whether these stories are typical or exceptional.

This paper seeks to document the short-to-intermediate-range impact of Hurricane

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- 1 U.S. Census statistics show that the New Orleans Metropolitan Statistical Area (MSA) ranked 356<sup>th</sup> among 371 MSAs in terms of growth in the Civilian Labor Force between 2000 and 2004, 304<sup>th</sup> in terms of growth in population between April 2000 and July 2005, and 301<sup>st</sup> in terms of percent change in housing units during the same time period. The Gulfport-Biloxi MSA ranked 238<sup>th</sup> in terms of labor force growth, 203<sup>rd</sup> in terms of population growth, and 91<sup>st</sup> in terms of housing unit growth. Much of the growth in the housing stock in Gulfport-Biloxi can be attributed to increasing quantities of seasonal units. The New Orleans MSA ranked 157<sup>th</sup>, and the Gulfport-Biloxi MSA 257<sup>th</sup>, in the proportion of adults with a bachelor's degree in 2000.
  - 2 See, for example, Nossiter, Adam “New Orleans of Future May Stay Half Its Old Size.” *New York Times*, January 21 2007, page A1.

Katrina on its evacuees, making use of information collected in the Current Population Surveys of November 2005 through October 2006, which inquired whether respondents had evacuated, temporarily or permanently, due to the storm. To the extent that residence in New Orleans had a negative impact on individual outcomes, evacuation following the storm could well be beneficial. On the other hand, the disruptions associated with losing one's home, one's job, and contact with friends and relatives could easily dominate such a positive impact. The relative importance of these two effects could also easily change over time.

Results indicate that Hurricane Katrina had a strong negative impact on the labor force participation of evacuees, particularly those who were unable to return to their initial address within a few weeks of landfall. Evacuees on the whole lost three weeks of work, on average, in 2005; the effect is concentrated particularly among those who did not immediately return to their pre-Katrina address; this group averaged a loss of nearly 10 weeks of work in the last four months of 2005. The negative impact of evacuation on labor supply can be traced well into 2006. Although there is some evidence of improvements between November 2005 and February 2006, beyond that latter date persistent evacuees have employment rates roughly ten to twenty percentage points lower, and average five to eight fewer hours worked per week, every month through October 2006, with no evidence of diminishing effects over time. These effects are estimated using a quasi-difference-in-difference framework, comparing evacuees both to observably similar non-evacuees and to pre-Katrina observations of individuals who were destined to become evacuees.

Specifications interacting the effect of long-term evacuation with characteristics of the host community show that economic characteristics, such as unemployment rates and price levels, have little if any connection with evacuee outcomes. There is some relatively weak

evidence that evacuees fared better in smaller metropolitan areas, or areas with an industrial mix similar to that of New Orleans. These effects could reflect selection by evacuees rather than any causal impact of host community characteristics.

Hurricane Katrina occasioned much debate in the United States regarding the proper size and scope of the social safety net, raising particular concerns that the storm's victims were not properly served by government in its wake. Results derived from the March supplements to the CPS indicate that, at least in financial terms, evacuees received significant a significant boost in public assistance, and this assistance served to dampen the storm's impact on overall income in calendar year 2005. Evacuees also exhibit a tendency to increase their self-employment activities in response to the decline in paid employment. It is unclear whether public assistance, which is in most cases temporary by design, will similarly insulate evacuees against the effects of reduced employment observed in 2006.

In all, the results indicate that media reports of successful adjustments by Katrina evacuees do not accurately represent the average experience of those who have yet to return to their pre-evacuation address. They also provide no evidence to support the notion that residence in the greater New Orleans area had a causal negative impact on labor market-related outcomes. While it is still conceivable that prospects for long-term evacuees could improve in the very long run, evidence suggests that such a convergence process could take several years.

Section II provides some basic background information on the city of New Orleans and its labor market prior to the hurricane. Section III describes Katrina evacuees. Section IV provides a conceptual discussion outlining the arguments for positive and negative impacts of evacuation on outcomes. Section V describes the analysis sample and estimation strategy. Section VI presents results, and section VII concludes.

## II. A brief history of New Orleans

The city of New Orleans rose to prominence in the early part of the 19<sup>th</sup> century. As a port city at the mouth of the nation's largest river system, the city played a strong role in the export of goods produced in the nation's interior. In 1840, the city was the fourth largest in the United States, representing sixth-tenths of one percent of the nation's population. As Figure 1 shows, the city continued to grow for a period of 120 years after 1840. This trajectory is somewhat misleading from a relative perspective, as population growth in the remainder of the country exceeded that in the city of New Orleans over this time period. By 1960, the city's rank in the size distribution of cities had declined substantially.

The relative decline of New Orleans over the 165 year period between 1840 and 2005 reflects three basic factors. First, continuous improvements in more direct transportation links between the central and Eastern United States vastly reduced New Orleans' importance as a port. Second, the city and its surrounding region did not experience the degree of industrialization shown in other parts of the country in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, and likewise did not exhibit the growth in knowledge-based industries that marked growing areas in the past half-century. Finally, much of the absolute decline since 1960 has been attributed to the racial integration of the city's schools, which spurred a wave of suburbanization on the part of white residents. In recent decades, however, both the white and black populations of the city have been declining.

Figure 2 illustrates the net impact of these trends on employment patterns for New Orleans residents as of the 2000 Census. The height of each bar in this graph reflects the ratio of New Orleans employees in a given industry to national employment in that industry. The horizontal red line shows the ratio of New Orleans' population to that of the United States. Were

the city a perfect microcosm of the nation, each bar would rise exactly to the height of the red line.

In fact, employment in eleven of fifteen industry groups is under-represented in New Orleans relative to the nation as a whole. This pattern is strongest in the manufacturing sector and in sectors that have driven city growth in the post-industrial era: information, finance insurance and real estate, construction, and professional services. Given the city's legacy as a river port, it is somewhat surprising to note that the city does not have a particularly large number of employees in the transportation and warehousing center. The only sectors of the economy with a disproportionate share of national employment are accommodations and food service and arts, entertainment and recreation. The economic base of the city is tourism, and a large number of residents find employment in the relatively low-paying sectors that cater to these visitors.

The final column in Figure 2 shows the ratio of total employment among New Orleans residents to total employment in the United States. The failure of this bar to reach the horizontal red line suggests that the city had an overall underemployment problem in 2000. It is important to note, however, that these basic statistics do not correct for basic demographic differences between New Orleans residents and the remainder of the country. Evidence reported below suggests that much of this employment gap can be explained by basic observable characteristics.

Largely because of the absolute decline in population since 1960, housing in New Orleans was in a condition of oversupply prior to Hurricane Katrina. In this respect, the city was similar to many other declining regions (Glaeser and Gyourko 200x). According to the 2004 American Housing Survey, the median owner-occupied housing unit in the New Orleans metropolitan area measured 1,800 square feet and was valued at roughly \$120,000. This



valuation of \$67 per square foot implies that it would have been impossible to make a profit by building standard-quality housing units in New Orleans prior to hurricane Katrina.

Overall, then, pre-Katrina New Orleans can be thought of as a place with a relative shortage of jobs, particularly high-paying jobs in growth industries. The impact of the weak labor market on residents' quality of life was blunted to some extent by the relatively low cost of housing in the city. Given the wholesale destruction of much of the city's housing stock, this equilibrium will be impossible to recreate absent massive subsidies to housing construction.

### **III. The Hurricane Katrina Evacuees**

Information regarding the characteristics and outcomes of Hurricane Katrina evacuees is derived from the Current Population Survey (CPS) monthly enumerations spanning a period from August 2004 through October 2006.<sup>3</sup> Between November 2005 and October 2006, the survey explicitly asked respondents if they were hurricane Katrina evacuees, whether they had returned home if so, and what state they had lived in prior to the storm if not. The CPS is a longitudinal survey in which respondents are interviewed for four consecutive months, then not interviewed for eight months, and interviewed again for four consecutive months. Thus, some stated evacuees are observed both before and after the storm.

Individuals who participated in the CPS prior to August 2005, but then evacuated and never returned to their home address, usually drop out of the longitudinal sample.<sup>4</sup> Thus it is not possible to directly compare pre- and post-evacuation characteristics for individuals who never return home. It is possible, however, to make inferences regarding which individuals dropping

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3 Individuals with last scheduled interview dates in August 2005 or earlier are excluded from the analysis, as it is not possible to observe or infer evacuee status for this group.

4 For example, a total of 9 individuals are observed both in the March 2005 CPS and as non-returning evacuees in the March 2006 CPS. Based on estimates of the total number of long-term evacuees, the actual number should have been between 100 and 150.

out of the sample because they evacuated in the wake of Hurricane Katrina. In this analysis, any individual observed as a resident of Louisiana or Mississippi prior to August 2005, with at least one scheduled interview after August 2005, who missed that interview and all subsequent interviews, is coded as an evacuee. These individuals are observed only prior to evacuation.

Table 1 reports summary statistics for some basic background characteristics for evacuees and the remainder of the population, using information from individuals' last observed interview date within the sampling frame of this analysis. For purposes of this and subsequent analysis, the sample is restricted to individuals between the ages of 25 and 65. The unweighted count of individuals who either report evacuee status at least once in their interview cycle, or meet the criteria stated above for inferring evacuee status, is nearly 2,000. Of these individuals, roughly 40% are long-term evacuees who never return to their pre-Katrina residence, and 25% are individuals who do return to their pre-Katrina residence. The remaining portion of the sample consists of individuals who report conflicting information about evacuee status, claiming that they had evacuated in at least one wave, but denying this claim in their last interview. These “deniers” will be treated as a separate category of potential evacuee in much of the remaining analysis.

Given the ubiquitous press coverage of the storm's aftermath, it is hardly surprising to learn that evacuees were in many respects disadvantaged relative to the population at large. Overall, evacuees are disproportionately African-American, less-educated, more likely to be female, and less likely to be married with a spouse present in the household. Despite this lower marriage rate, evacuees are equally likely to reside with young children.

Within the set of evacuees, there is a stark disparity between those who had returned to their pre-Katrina address by the date of their last interview and those who had not. The latter

group is on average nearly five years younger, almost twice as likely to be African-American, twenty percentage points less likely to be married with a spouse present in the household, yet if anything more likely to be living with children under the age of five. This remarkable degree of disparity foreshadows many of the results to be revealed below, which will indicate that returnees are faring far better than longer-term evacuees.

The analysis below will adopt a differences-in-differences type framework to infer the impact of evacuation on evacuees. This task is complicated by the fact that truly longitudinal information is absent for many evacuees; one sample of evacuees in the pre-Katrina period is effectively exchanged for a second sample in the post-Katrina period. Table 1 offers some reassurances on the suitability of this exchange; the summary statistics for the two groups are generally similar, and none of the differences in means or proportions reported are statistically significant at conventional levels. The lowest  $p$ -value for any of these hypothesis tests is 0.24. The samples are also of comparable size.<sup>5</sup>

#### **IV. Should the Katrina Effect be Positive or Negative?**

When considering the potential impact of a shock such as Hurricane Katrina on individual utility, it is useful to think of the shock as having three simultaneous impacts. The first is to fundamentally alter the supply of housing, amenities, and local public goods in the affected location. The second is to exogenously move households originally residing in that location. Following the initial impact, the shock may have secondary impacts on characteristics of other locations to which evacuees migrate. The third is a direct negative wealth shock, which is experienced by households that were inadequately insured against loss of any property

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<sup>5</sup> The slightly larger size of the pre-evacuation sample may reflect the mis-categorization of individuals who would have dropped out of the CPS regardless of Hurricane Katrina as evacuees.

destroyed by the storm.

Even abstracting from the wealth shocks, in a completely frictionless model, the net effect of the other impacts must be negative. By revealed preference, the initial residents of the affected area preferred the bundle of amenities and housing prices there to those available in other locations.<sup>6</sup> The combination of reducing the value of that bundle and forcing some households to at least temporarily refrain from consuming it could only have negative impacts on those initial residents. Beyond these effects, which should be apparent in the long-run, there may be additional short-term negative impacts associated with the search for new employment or new social networks in a new location.

The world is most assuredly not frictionless. Incorporating moving costs or other frictions into a location choice model introduces the possibility that individuals are suboptimally located in equilibrium, and thus might accrue some benefit from the relocation experience. Transaction costs associated with moving may prevent households from arbitraging known utility differentials across space. Zoning laws may prevent households from consuming their most desired bundle of housing services, amenities, and local public goods. Housing market discrimination, past or present, may lead individuals to locate in neighborhoods they would not otherwise select. Finally, individuals may be less than fully informed about the alternatives in their choice set, particularly regarding the degree to which their choice of location influences varying outcomes related to their own employment, health, or children's well-being. This lack of information may be especially acute when considering locations outside one's current labor market area.

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<sup>6</sup> In the case of New Orleans, the housing prices available to residents prior to Hurricane Katrina were almost certainly lower than construction costs: 2004 American Housing Survey data indicate that the median house value was \$120,000 and the median owner-occupied unit size was 1,800 square feet. The reduction of housing prices to below construction costs is a common characteristic of declining cities (Glaeser and Gyourko 2004).

The possibility that households, particularly those located in distressed neighborhoods within declining metropolitan areas, have systematically made suboptimal or inappropriately constrained location choices underlies the so-called “spatial mismatch” hypothesis (Kain, 1968) and numerous other theoretical arguments positing a causal link between locational characteristics and individual outcomes (Gephardt 1997; Ellen and Turner 1997). These arguments have inspired numerous studies attempting to measure the relationship between neighborhood or metropolitan area-specific characteristics and individual outcomes (for reviews, see Jencks and Mayer 1990, Ellen and Turner 1997, Gephardt 1997 and Vigdor 2006).

These arguments have also motivated policy interventions including the MTO demonstration program, which randomly assigned residents of public housing projects in one of five cities to receive housing vouchers good only for units in low-poverty neighborhoods, to receive unrestricted vouchers, or to receive no special assistance (Kling et al., 2004). From a theoretical perspective, a voucher that restricts household location choices can only improve outcomes relative to an unrestricted voucher with the same cash value if households systematically make suboptimal choices regarding where to live. If such a presumption is in fact true, then it might be reasonable to expect that households forced to relocate following a natural disaster such as Hurricane Katrina are rendered better off in the long run.

Evidence from MTO evaluations conducted to date provide a limited amount of evidence that relocation from a high-poverty neighborhood improves individual outcomes. While recipients of the restricted vouchers generally post no income gains relative to other groups, they do report higher levels of self-reported mental health and show improvements in physical health in at least some dimensions (Kling et al. 2004). There is also some evidence that relocation to a low-poverty neighborhood improves behavioral outcomes for girls, while potentially worsening

such outcomes for boys (Kling and Liebman 2004). The non-uniformity of the results in the end provides little guidance regarding whether placing restrictions on location choice improves the welfare of participating households. Such households may, for example, be willing to trade off lower self-reported mental health for fewer behavior problems from their male children.

While the MTO demonstration program can be used to measure the potential benefits of constraining location choices within a metropolitan area, there are a number of additional potential benefits associated with relocating across metropolitan areas. Neighborhoods in the same city share the same school system, and many of the potential benefits from switching schools within that system can be achieved by use of existing school choice programs implemented in many cities. Neighborhoods in the same city also share, to a large extent, the same labor market. If a metropolitan area offers few opportunities for low-skilled workers, location within that area should matter little for employment-related outcomes. By contrast, relocating families from a depressed city such as New Orleans to more affluent metropolitan areas with more robust job markets and better-functioning public schools could have a much more positive impact.

In summary, there are many reasons to expect the effect of Hurricane Katrina to be negative. The loss of underinsured property represents a negative wealth shock. The storm may have reduced the value of New Orleans and surrounding areas by destroying amenities or increasing the cost of providing local public goods. The storm may also have reduced individual welfare by forcing mobility among those who considered themselves optimally located.. Finally, the storm may have induced a number of short-term adjustment costs, as individuals adjusted to new labor markets, established new social and employment networks, and assimilated into new environments.

At the same time, the removal of low-skilled workers from a labor market with insufficient opportunities could potentially be beneficial. Because of the short-term costs associated with displacement, these benefits may be more apparent in the intermediate- to long-run. To the extent that these benefits are delayed, while costs are immediate, their existence can never directly imply that evacuee households were rendered better off by the storm.

## **V. Estimation Strategy**

The primary challenge for evaluating the impact of Hurricane Katrina on evacuees is inferring what those individuals would have experienced had the storm not occurred, or had they not been forced to evacuate. Unlike the MTO demonstration program, there is no readily identifiable control group designed to estimate this counterfactual. This study will employ a simple difference-in-difference methodology to infer the impact of evacuation on evacuees. Implementation of this strategy requires a source of data that provides observations on both evacuees and non-evacuees before and after the storm occurred. In principle, the Current Population Survey satisfies this criterion, for reasons described in Section III above, with the caveat that two independent samples of long-term evacuees are utilized, one representing the pre- and one the post-evacuation period. Since the analysis does not rely on a true longitudinal link of pre- and post-Katrina observations, the sample includes information on all individuals who were asked questions about their evacuee status between November 2005 and October 2006, regardless of whether they entered the CPS sample before or after the storm.

The analysis sample is restricted to individuals between the ages of 25 and 65. There are roughly 433,000 person-month observations representing 133,000 unique individuals in the pre-Katrina period. This total includes 2,785 monthly observations on 846 unique individuals who

became evacuees after the storm. This number includes 411 individuals who were actually observed in the post-Katrina period, and 435 others who resided in Louisiana or Mississippi prior to the storm and missed all interviews scheduled after August 2005. The post-Katrina sample consists of roughly 976,000 person-month observations on 282,000 unique individuals, of which 5,000 observations on nearly 1,500 unique individuals report having evacuated due to Hurricane Katrina in at least one survey wave.

It should be noted that CPS respondents were asked to state their evacuee status as many as four times in successive months, and there are many instances where individuals give inconsistent answers across months – for example, reporting that they had evacuated in one month but reporting that they had not evacuated in the next month. In this analysis, individuals are considered evacuees if they report having evacuated one or more times in interviews conducted in November 2005 or later. In some specifications, individuals who contradict themselves across months will be singled out as a separate class of evacuee.

Most estimated equations will be of the form:

$$(1) Y_{it} = \alpha_{\tau} + \beta_1 X_{ijrt} + \beta_2 E_i + \beta_3 E_i P_t + \varepsilon_{it}$$

where  $i$  indexes individuals and  $t$  time. The outcome variable  $Y$  is a measure of employment, earnings, or health status. The term  $\alpha$  is a month-specific fixed effect. The vector  $X$  contains information on age, race, gender, educational attainment, marital status, and presence of own children under five in the household. Individuals who either are or destined to become evacuees are identified by the indicator variable  $E_i$ . The effect of evacuation will be estimated by the coefficient  $\beta_3$ , associated with the interaction between  $E_i$  and the variable  $P_t$ , which identifies whether a month is before or after August 2005. The  $\varepsilon$  term is an individual-by-month specific error term.



In some specifications, evacuees observed in the post-Katrina time period will be differentiated by whether they have returned to their pre-evacuation address. Estimates derived from these specifications carry a different interpretation from the basic models. While it can easily be argued that Hurricane Katrina was an exogenous shock that forced residents to evacuate, the decision to return to one's previous address is potentially endogenous, and differences among evacuees who did or did not return quite reflect selection rather than any causal impact of being a longer-term evacuee. The summary statistics displayed in Table 1 show important pre-existing differences between the two sets of evacuees. Disadvantaged evacuees may have been less likely to return because their homes were in neighborhoods that experienced greater flood damage, because they lacked the resources to complete repairs to their home, or because they were unable to afford the cost of a return journey to the greater New Orleans area. For these reasons, the results of these specifications should be considered descriptive rather than revealing any causal impact of long-term evacuation.

In other specifications the impact of evacuation will be allowed to vary over time, to study the process of recovery from the initial shock to labor force participation. Models will be estimated to assess the lingering impact of evacuation on all evacuees, and then specifically on those evacuees who have yet to return to their pre-evacuation address. Again, these latter estimates are best considered descriptive in nature rather than true causal impacts of evacuation for a certain number of months.

Finally, in still other specifications, current evacuees will be distinguished by characteristics of their current metropolitan area of residence. These characteristics include the logarithm of metropolitan population as of July 1, 2005, the population growth rate between 2000 and 2005, the logarithm of fair market rent for a two bedroom apartment, the logarithm of

the monthly TANF benefit for a family of three in the state where the majority of the metropolitan area's population resides, the unemployment rate as of July 2005, the logarithm of distance to New Orleans, and the logarithm of the number of metropolitan area residents employed in the arts, entertainment, accommodation, and food service industries.<sup>7</sup> As evacuees may sort endogenously into metropolitan areas with differing characteristics, these estimates are also best considered descriptive in nature. They might either suggest something about the nature of the causal impact of location characteristics on evacuee outcomes, or the nature of the evacuee sorting process.

## **VI. Results**

### *VI.A Basic estimates of the impact of evacuation*

Table 2 presents very basic estimates of the impact of Katrina-related evacuation on labor market outcomes, the number of hours a respondent worked in the week prior to an interview and a binary indicator for whether the respondent worked for pay at all in the preceding month. Both specifications are estimated using ordinary least squares regression, and utilize the complete CPS longitudinal dataset covering months between August 2004 and October 2006. The specifications regress two measures of labor force participation on a set of three explanatory variables: an indicator for whether an individual is destined to become, is, or was an evacuee, a binary indicator for months after August 2005, and an interaction between these two binary indicators. The result is a basic difference-in-difference style estimate.<sup>8</sup>

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7 Population, growth, employment, and unemployment figures are derived from US Census publications; distance to New Orleans is between city centers, measured in miles using Google Earth software; fair market rent data is taken from the HUD FMR documentation system, and TANF benefits are taken from the welfare rules database maintained by the Urban Institute.

8 As there are potentially multiple observations per individual before and after Hurricane Katrina, serial correlation in outcomes could lead to spurious difference-in-difference estimates (Bertrand, Duflo, and Mullainathan, 2004). Given the relatively short panel length for each individual and the relatively large number of individuals, this concern is addressed by clustering standard errors at the level of the individual. This

Consistent with the notion that residents of the New Orleans and Gulfport-Biloxi areas had relatively poor economic outcomes even prior to the hurricane, the main effect of being an evacuee is estimated to be negative and significant in both specifications. Relative to other individuals between the ages of 25 and 65, individuals destined to become evacuees worked nearly 2 fewer hours in the week prior to a CPS interview, and were four percentage points less likely to be employed in the preceding month. These effects are relatively sizable: the average number of hours worked by individuals in the CPS is 32, with a standard deviation of 20; and roughly 73% of respondents in the analysis sample report employment in the preceding month.

The results indicate a modest, yet statistically significant, trend towards increased labor force participation over time, as respondents reported working an extra 8 minutes each week and were 0.3 percentage points more likely to be employed overall after August 2005. This trend quite clearly did not hold for Hurricane Katrina evacuees, however. The interaction term between evacuee and the post-Katrina time period is negative and significant in both specifications, indicating that evacuees, on average, worked nearly 3 fewer hours per week after the storm relative to before, and were 8.3 percentage points less likely to be employed in the month prior to the survey.

Indicators of significant differences between those destined to become Katrina evacuees and others prior to August 2005 raises serious concerns that the simple difference-in-difference estimates may fail to accurately represent the true impact of the storm on individual outcomes. Any contemporaneous trends towards worse (or better) outcomes for those with tenuous labor force attachments will bias these coefficients. To address these concerns, Table 3 presents refined estimates of the impact of evacuation, adding a set of demographic control variables to

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procedure is used in each regression specification utilizing the full panel of monthly CPS observations.

the simple Table 2 specifications. These additional variables, including a quadratic in age, and indicators for black individuals, marital status, presence of own children under 5 in the household, and educational attainment, improve the fit of both models and display a quite sensible pattern of results. Labor force attachment is particularly strong among the more educated, among those closer to 40 years old, and among married males and males with young children. Attachment is weak for those who are black and females, especially those who are married and live with their own children. The specifications also incorporate month fixed effects, as in equation (1).

The introduction of these control variables substantially attenuates the main effect of Katrina evacuee status. In other words, the tendency for individuals destined to become evacuees to display lesser degrees of labor force attachment prior to the storm can largely be explained on the basis of other observable characteristics. In both specifications, the coefficient on the main evacuee effect is less than half the value of its table 2 analogue, and statistically insignificant. By contrast, the interaction terms, which identify the difference-in-difference estimate of the impact of evacuation itself, are only slightly attenuated relative to Table 2. In both cases, the coefficient is roughly 10% smaller than in the more parsimonious specification; both coefficients retain statistical significance at the 1% level. The point estimates indicate that after evacuating, evacuees were 7.5 percentage points less likely to work for pay in the month prior to a CPS enumeration, and averaged 2.5 fewer hours of work in the week prior to the survey. This represents a substantial increase in the probability of non-employment; the decrease in hours worked is somewhat smaller, at roughly 12% of a standard deviation, perhaps suggesting that some evacuees who found employment actually increased their work effort relative to before the storm.

Descriptive evidence of exactly such a differential pattern is uncovered in Table 4, which distinguishes evacuees in the post-Katrina period by whether they had returned to their pre-Katrina address at the time of enumeration, or remained in a different location. The results reveal a striking disparity between these two groups of evacuees, which was perhaps foreshadowed by the differences in basic summary statistics revealed in Table 1 above. Evacuees who had returned to their pre-Katrina address, or “returnees,” generally display no ill effects in terms of labor force attachment relative to their pre-evacuation outcomes. In fact, point estimates suggests that these individuals actually work more after the storm, though the interaction terms are not statistically significant. Long-term evacuees, who are currently away from their pre-Katrina residence, display a very large, significant tendency to work less after evacuation relative to before. The point estimate of 7.3 fewer hours of work in the week prior to an interview is equivalent to one-third of a standard deviation. Employment in the month prior to the survey falls by 18 percentage points for this group. Thus, the failure to distinguish between returnees and long-term evacuees obscures a remarkable disparity in experiences. Evacuees who have returned to a state of normality in terms of physical location have also attained a relatively normal state of labor force participation. Long-term evacuees, by contrast, have extremely elevated rates of non-employment. It is important to reiterate that these estimates do not necessarily reflect the impact of longer-term evacuation on outcomes. Indeed, it is quite likely that long-term evacuees would have had more difficult experiences even if they had returned to their pre-Katrina address. Nonetheless, the finding that such evacuees are undergoing a difficult experience relative to observably similar individuals strongly contrasts the view that evacuees are finding their way to greater prosperity outside the greater New Orleans area.

Survey respondents who give inconsistent answers to questions regarding evacuee status are treated as a separate category in Table 4. While these individuals are included in the sample of returnees or long-term evacuees, as appropriate, in months where they indicate that they had evacuated due to hurricane Katrina, in months where they deny evacuation they are assigned a value of 1 for an indicator variable labeled “Deny evacuee status this month.” As Table 4 indicates, these deniers show a slight, though insignificant, tendency to work less than otherwise similar individuals. Table 4 also shows that distinguishing between long-term evacuees and returnees has the impact of increasing the magnitudes of the main evacuee effect, to a value between those observed in Tables 2 and 3. This re-introduces the possibility that evacuees differ from the remainder of the population along unobserved dimensions, which could in turn bias the estimates of the impact of evacuation on individual outcome. This caveat will remain in effect for the remainder of the analysis.

#### *VI.B Tracing the impact of evacuation over time*

Do the labor market impacts of evacuation diminish over time? If so, how long does it take before evacuees return to a normal level of labor force participation? Table 5 presents estimates that address these questions, while also providing some evidence on the experiences of evacuees who fail to return to their pre-Katrina address.

In the first two columns, the variables of interest are interactions of evacuee status with an exhaustive set of 12 month indicator variables. Evacuees in these specifications are not distinguished by their location at the time of the interview, to address concerns of endogenous return. These specifications show a large, significant initial impact of evacuation that diminishes over time. In November 2005, evacuees reported almost 4 fewer hours of work in the week prior

to their interview, and were 12 percentage points less likely to be employed in the previous month. Both effects are statistically significant at the 1% level. By March 2006, point estimates suggest that these impacts had halved, with a lower degree of statistical significance. From June 2006 onward, there is no longer evidence of a statistically significant impact of evacuation on labor market outcomes, with the exception of point estimates from October 2006, which are significant at the 10% level. All but one point estimate from these last five months of the sample are negative, which points towards the conclusion that there were some lingering effects of evacuation even a year after Hurricane Katrina, but these impacts were of relatively small magnitude.

The final specifications in Table 5 replace the interaction of month with evacuee status with an interaction between month and long-term evacuee status. Once again, the possibility of selection into long-term evacuee status renders causal interpretation of these estimates inappropriate, but it is still informative to examine the experiences of long-term evacuees. These results indicate that long-term evacuees, like returnees, exhibit some degree of recovery following the initial negative shock to employment. Between November 2005 and February 2006, the estimated impact on hours worked falls by more than half, and the impact on employment in the previous month falls by almost half. The negative impacts in February 2006, however, are still sizable: point estimates imply that long-term evacuees worked 5 fewer hours per week in that month, and were 16 percentage points less likely to be employed at all, relative to pre-evacuation patterns. Moreover, there is no consistent evidence of further convergence toward normalcy in months following February 2006. The long-term evacuee employment deficit in October 2006, the last month in which evacuee status is directly observed, is statistically indistinguishable from the impact measured in February. Month-by-month, point

estimates for the impact of evacuation are consistently negative, statistically significant at the 10% level in all but one instance, and significant at the 5% level in all but two cases. The point estimates show a tendency to fluctuate considerably from month to month, which most likely reflects the small number of observations identifying the impact in any given month.<sup>9</sup> Once again, these estimates, though not necessarily causal in nature, reveal that long-term evacuees are experiencing substantial hardship in the labor market relative to observably similar non-evacuees.

### *VI.C Spatial variation in the impact of evacuation*

Katrina evacuees relocated to a large number of settings. In the CPS data, self-reported current evacuees were found in 94 different metropolitan areas, as well as nonmetropolitan areas. In theory, the outcomes of evacuees might well have been influenced by the characteristics of the host community. In practice, disentangling any effect of host community characteristics from the potentially endogenous selection into host communities on the part of evacuees would be a difficult task.<sup>10</sup> Table 6 presents basic evidence on the relationship between host community characteristics and the experiences of Katrina evacuees.<sup>11</sup> This evidence does not necessarily

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9 One concern with this estimation strategy is that long-term evacuees may have become a more negatively selected group over time, as some individuals drop out of this group as they return to their pre-Katrina address. Within the analysis sample, there are 84 cases of current evacuees dropping out of the sample before the end of their CPS interview cycle. These dropouts are significantly more educated than the overall sample of current evacuees: whereas 22% of current evacuees have a college degree, 27% of evacuees who drop out of the sample early have such a degree. To gauge the impact of this attrition on estimates of the impact of current evacuee status, the models in Table 5 were re-estimated, excluding individuals who dropped out of the sample prior to the end of their CPS interview cycle. The results are substantively unchanged from those reported in Table 5.

10 Media reports shortly after the storm indicate that there may have been at least some randomness to the pattern of evacuee relocation. Some evacuees reported being placed on an airplane, unaware of its destination until they arrived. Were these initial locations, and the manner by which respondents arrived at those initial locations, recorded in some way it might be possible to instrument for current location characteristics with initial location characteristics. There does not appear to be any data source which records this information, however.

11 The reported specifications include interactions of current evacuee status with eight community-level characteristics. Specifications including only one such interaction generate a set of results very similar to those reported here.



represent the causal impact of community characteristics on evacuee outcomes; it may also describe the endogenous sorting of evacuees into host communities.

The results in Table 6 indicate that there is little statistically significant evidence of differential labor market outcomes among evacuees who relocated to different types of cities. The only effect attaining statistical significance, at the 10% level, relates to the interaction of current evacuee status and the logarithm of city population. Evacuees residing in larger cities show a tendency towards fewer hours worked in the previous week. A similar, though statistically insignificant, effect can be seen in the companion specification examining the probability of employment in the previous month. The most plausible explanation for this pattern would be a tendency for evacuees to avoid smaller labor markets unless they had a strong connection to a particular area.

The set of characteristics with no significant association with evacuee labor market outcomes is impressive. One might expect evacuees to fare better in growing labor markets with low pre-existing unemployment rates, or with a high concentration of employment in the accommodation, food service, or entertainment industries that formed such an integral part of the economy in greater New Orleans. Although there is some weak evidence that evacuees fared better in cities with a greater tourist orientation, the estimated impacts of growth and unemployment are small and wrong-signed.<sup>12</sup> Of course, it is possible that evacuee sorting on unobservables obscures some true causal effects of these variables.

Previous research points toward important migrant selection mechanisms related to distance and size of one's racial or ethnic group in the destination city (Vigdor 2002). There is no tendency, however, for evacuees to display superior outcomes at further distances from New

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<sup>12</sup> Las Vegas, NV was a very common destination for Katrina evacuees.

Orleans, or in locations where there were fewer evacuees in relation to population. There is also no evidence that the generosity of welfare benefits in destination cities influences evacuee labor market participation. Finally, there is some relatively weak evidence that evacuees who relocated to more expensive cities, as measured by fair market rent levels established by the department of Housing and Urban Development, displayed greater labor force attachment.

The inability to separate potential treatment effects from selection effects in these specifications limits their inferential usefulness. As descriptive evidence, however, they show a quite striking lack of correlation between most community-level characteristics and evacuee outcomes. There is no particular place in the United States where one can point to the exemplary experiences of Hurricane Katrina evacuees.

#### *VI.D The March supplement: impacts on annual income and self-reported health status*

Monthly CPS interviews collect only a limited amount of information on potentially interesting economic and social outcomes. A larger array of information is available in the March supplement to the CPS, which collects additional information regarding annual earnings and other sources of income in the previous calendar year, as well as information on health insurance coverage and self-reported health status. The remaining tables in this paper evaluate outcomes taken from the March supplements of 2005 and 2006. In each specification, the sample is limited to those for whom Katrina evacuee status can be inferred. In 2006, this includes all respondents who were part of the main CPS sampling frame. In 2005, this includes respondents in a longitudinal sample who were scheduled to have at least one interview after August 2005.

Table 7 presents the results of specifications that are fundamentally similar to those in

Table 3, focusing on two measures of income in the previous calendar year, weeks worked in the previous calendar year, and a binary indicator of whether an individual reported that their health was “excellent” when asked to rate it on a five-point scale. Estimates in the log total income and log earnings models are derived from a tobit specification, which addresses the concern that the dependent variable is censored for individuals with nonpositive values of either variable.<sup>13</sup> The remaining estimates are derived from OLS specifications. The sample for each outcome variable is greatly reduced relative to prior specifications, as observations are drawn from only two months. As a result, the precision of many regression estimates is considerably lower than in previous tables, particularly when analyzing Katrina evacuees.

Point estimates indicate that individuals destined to become evacuees collected considerably less income, from earnings and from other sources, in calendar year 2004. This effect is noteworthy particularly because the specification controls separately for education levels, race, and family status, which undoubtedly differ significantly between evacuees and the population at large. The estimated effect of evacuee-to-be status is significant at the 10% level when analyzing the logarithm of total income, but not for earnings.

The actual impact of evacuation on these measures is given by the interaction term between the evacuee indicator and the year 2006 indicator. Both point estimates are negative, indicating that evacuation reduced both earnings and total income by about 30% in 2005 relative to 2006; however standard errors on both estimates are rather large and neither coefficient can be statistically distinguished from zero.

The impact of evacuation on labor supply, as measured by weeks worked, shown in the tables' third column, is statistically significant. The point estimate indicates that evacuees, who

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<sup>13</sup> Ordinary least squares estimates omitting individuals with nonpositive values of earnings or total income produce qualitatively similar results.

displayed no significant tendency towards greater or fewer weeks worked prior to evacuation, lost three weeks' worth of work in 2005.

The final specification in Table 7 shows that evacuees-to-be displayed a slight, though insignificant, tendency to self-report lower health status in March 2005. The interaction term, though also insignificant, is positive and nearly twice the magnitude of the main effect, which suggests that the impact of evacuation on self-reported health status could be positive. While it is surely speculative to attach much weight to an insignificant coefficient, it should also be noted that the causal mechanism for such an effect is not identified here. Evacuees may consider themselves to be in better health simply because they survived an ordeal; objective indicators of their health, such as body-mass index or blood pressure levels, could conceivably show no change or even a negative impact.

Table 8 presents the results of specifications that are analogous to those in Table 4, separating evacuees in March 2006 by whether they had returned to their pre-Katrina address, remained away from that address, or denied evacuee status in that month.<sup>14</sup> As in that earlier table, the results here should be viewed as primarily descriptive in nature, given evidence of strong selection into long-term evacuee status. Results show once again that long-term evacuees are faring poorly relative to returnees. The difference in annual earnings between long-term evacuees and observably similar individuals, including pre-evacuation residents of the greater New Orleans area, is negative and significant at the 1% level. There is a similarly negative association between long-term evacuee status and total annual income, though this difference is not statistically significant. Point estimates indicate a substantial difference in the labor supply of returnees relative to long-term evacuees. The estimate for returnees, though insignificant,

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<sup>14</sup> “Denier” status is inferred by reference to monthly interviews before or after March 2006.

suggests that this group lost about two weeks of work in 2005. Long-term evacuees, by contrast, lost nearly 10 weeks of work on average. This amounts to the majority of time remaining in calendar year 2005 after Katrina's landfall. This effect is statistically significant at the 1% level. Point estimates in the self-reported health specification continue to be insignificant, but are generally inconsistent with the hypothesis that evacuation had differential impacts on returnees and long-term evacuees.

Hurricane Katrina did much to expose the vulnerability of poorer members of American society. It raised many questions regarding the viability of a social “safety net” in the United States, and engendered a public debate regarding societal obligations towards socially and economically marginalized groups. Results in Table 8 above suggest that some form of insurance mechanism operated for Katrina evacuees, as the estimated differences in earnings between long-term evacuees and observably similar non-evacuees are larger and more significant than the differences in total income. Table 9 rounds out the analysis by examining non-earnings income for long-term evacuees and others, to ascertain which if any mechanisms can account for the relatively moderate estimated overall income difference. The specifications here closely resemble those in Table 8, where evacuees are distinguished by whether they had returned to their pre-Katrina address, remained in a second location, or denied evacuee status in March 2006. Each regression specification is estimated with a Tobit model, to account for the prevalence of non-positive observations in each category of supplemental income.

Results in the first column indicate that all categories of evacuees experienced a substantial increase in public assistance income, defined as income from transfer programs including TANF and other cash welfare programs, unemployment compensation, disability insurance, and SSI. The most dramatic effect is among long-term evacuees, consistent with the

notion that this group suffered the most negative shock to labor supply in the wake of Hurricane Katrina. Public assistance received by this group is several orders of magnitude higher than levels reported by other categories of evacuees, or by non-evacuees with similar observed characteristics. While public assistance was concentrated in this group, it should be noted that both returnees and those who denied evacuee status in March 2006, but claimed it in other months, report dramatically elevated levels of public assistance income.

The second column analyzes variation in the amount of private assistance income, defined as the sum of income that came in the form of gifts, child support, and alimony. While much of this income might be expected to arrive regardless of evacuee status, it is at least conceivable that donors of such assistance would be especially likely to act in the wake of the hurricane. In fact, there is no evidence that any group experienced a statistically significant increase in private assistance. These results suggest a strong role for the public safety net, as opposed to private charity, in insuring households against the negative effects of a natural disaster.

The third column considers asset and entitlement income, defined as the sum of income from social security and retirement benefits, interest, dividends, rent, survivor's benefits, workmen's compensation, and veteran's benefits. One would not expect this form of income to respond to a disaster such as Hurricane Katrina, as it is largely determined by investments made or actions taken prior to the storm's landfall. The only possible exception to this rule would be rental income, which might be expected to fall for those who owned destroyed rental property in the gulf coast area, but increase for those who owned undamaged property. Indeed, there is no statistically significant evidence of a relationship between evacuation and this form of income.

The final specification analyzes self-employment income, defined as income from

operating a business, farm, and “other” sources. The primary components of the “other” category are income from hobbies, foster care payments, and severance packages. Both returnees and long-term evacuees exhibit elevated levels of self-employment income in the post-Katrina period. The effect can also be measured in the pre-Katrina period, as the main effect of evacuee status is positive and significant at the 5% level. Evacuees show a persistent tendency towards entrepreneurial or self-directed economic activity, and this tendency is particularly pronounced in the post-evacuation period. Long-term evacuees show the strongest tendency to increase their self-employment earnings, as the interaction term identifying current evacuees is large and significant at the 1% level. Returnees also display a statistically significant tendency to increase their self-employment income in the post-evacuation period. While this pattern might reflect increased creativity in finding gainful employment in a more chaotic labor market, it could also indicate that a number of evacuees received severance payments from employers who ceased operation after the storm made landfall.

## **VII. Conclusions**

In the aftermath of Hurricane Katrina, many observers speculated that the long-term consequences of evacuation might in fact be positive in many cases, as individuals found more gainful employment in metropolitan areas with economies more vibrant than turn-of-the-millennium New Orleans. The results reported in this paper imply that any such success stories are the exception rather than the rule, as the mean impact of current evacuee status on labor force participation-related outcomes is large, statistically significant, and negative. To be sure, there is some evidence to suggest a partial recovery in evacuee labor supply, which appears to have occurred in the first sixth months after the hurricane made landfall. Since that time, however,

there is no evidence of an upward trend in labor force participation among long-term evacuees. Individuals who have returned to the greater New Orleans-Gulfport-Biloxi area, by contrast, have attained a degree of normalcy in their labor supply. There is very little evidence to suggest that evacuees who relocated to metropolitan areas with more robust labor markets fared better or worse than others. The clearest bright spot in the picture is that long term evacuees' total income appears to have been lifted relative to their earnings, in part by the governmental safety net and in part by evacuees' ability to secure income from severance payments or self-employment.

Overall, these results do not paint a promising future for persistent evacuees. The transfer income that appears to have sustained them through 2005 is designed to be temporary, and there is very little evidence to suggest that their outcomes were on any sort of improving trend in the 6<sup>th</sup> through the 14<sup>th</sup> month after the storm. While it is most assuredly easy to find examples of success stories among the Katrina evacuees, the more general portrait provided by this evidence is of a societal problem that is not solving itself.

More generally, this evidence supports a growing body of experimental and quasi-experimental evidence that shows little support for spatial mismatch-type hypotheses positing a causal impact of locational characteristics on outcomes. There is no evidence here to support the notion that residents of New Orleans were foregoing a higher standard of living elsewhere because of moving costs or idiosyncratic attachment to place. Instead, they are more consistent with the notion that the poor labor market outcomes of these residents was a function primarily of their own personal characteristics and not of the place where they resided. As such, they imply that the most promising strategies for improving the welfare of individuals living in high poverty neighborhoods is to directly target their skills and human capital, rather than try to change the characteristics of their neighborhood.



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Table 1: Demographic statistics of prime-age Hurricane Katrina evacuees, CPS

Characteristic	Non-evacuees ( <i>n</i> =304,195)	Evacuees			
		Overall ( <i>n</i> =1927)	Returnees ( <i>n</i> =550)	Long-term, observed pre- evacuation ( <i>n</i> =435)	Long-term, observed post- evacuation ( <i>n</i> =408)
Age	43.88 (11.38)	43.90 (11.86)	46.41 (11.58)	41.75 (12.47)	41.99 (11.24)
Percent black	9.9%	31.3%	21.8%	37.5%	38.5%
Percent male	48.8%	44.5%	44.9%	45.7%	42.9%
Percent with high school diploma	88.3%	85.9%	90.7%	84.6%	81.6%
Percent college graduate	29.9%	22.0%	23.3%	19.3%	20.8%
Percent married, spouse present	60.4%	51.8%	64.2%	43.4%	42.9%
Percent with own children under 5	31.9%	31.9%	31.6%	33.1%	35.0%

Note: Figures are unweighted means, taken from the last interview month in which the individual is observed. Sample is restricted to individuals age 25-65. Standard deviations, where applicable, in parentheses. Evacuees observed “pre-evacuation” are individuals residing in the states of Louisiana or Mississippi who missed their first and all subsequent interviews scheduled for after August 2005. Statistics for all evacuees include individuals who report evacuee status at some point during their interview cycle but deny having evacuated at their last interview in the sample. Such individuals are referred to as “deniers” in subsequent tables. None of the differences in statistics for long-term evacuees observed before and after evacuation are statistically significant at conventional levels.

Table 2: Basic difference-in-difference estimates of the impact of Hurricane Katrina on evacuees

Independent variable	Hours worked last week	Employed in the previous month
Hurricane Katrina Evacuee	-1.82** (0.749)	-0.041** (0.016)
Post-August 2005	0.135* (0.076)	0.003** (0.002)
Evacuee*post-August 2005	-2.84*** (0.956)	-0.083*** (0.021)
N	1,401,669	1,402,261
R <sup>2</sup>	0.0003	0.0004

Note: Standard errors, in parentheses, have been adjusted for the clustering of individual observations. Regressions are estimated as linear models and weighted using CPS cross-sectional weights. Data source is the Current Population Surveys of August 2004 through October 2006. Hurricane Katrina evacuee status is defined in the text.

\*\*\* denotes a coefficient significant at the 1% level, \*\* the 5% level, \* the 10% level.

Table 3: Refined estimates of the impact of Hurricane Katrina on evacuees

Independent variable	Hours worked last week	Employed in the previous month
Hurricane Katrina Evacuee	-0.544 (0.664)	-0.017 (0.015)
Evacuee*post-August 2005	-2.50*** (0.848)	-0.075*** (0.019)
Female	-2.64*** (0.112)	-0.026*** (0.002)
Age	2.07*** (0.024)	0.042*** (0.001)
Age squared	-0.027*** (2.86*10 <sup>-4</sup> )	-0.001*** (6.11*10 <sup>-6</sup> )
Black	-2.13*** (0.109)	-0.044*** (0.002)
Married, spouse present	4.94*** (0.108)	0.083*** (0.002)
Married, spouse present*female	-8.57*** (0.142)	-0.137*** (0.003)
Own children under 5 present	1.72*** (0.102)	0.026*** (0.002)
Own children under 5 present*female	-6.61*** (0.137)	-0.111*** (0.003)
High school graduate	6.15*** (0.110)	0.133*** (0.003)
At least some college	2.14*** (0.084)	0.049*** (0.002)
Bachelor's degree	1.79*** (0.091)	0.032*** (0.002)
Post-graduate degree	2.07*** (0.119)	0.023*** (0.002)
Month fixed effects	Yes	Yes
N	1,401,669	1,402,261
R <sup>2</sup>	0.150	0.112

Note: Standard errors, in parentheses, have been adjusted for the clustering of individual observations. Regressions are estimated as linear models. Data source is the Current Population Surveys of August 2004 through October 2006. Hurricane Katrina evacuee status is defined in the text.

\*\*\* denotes a coefficient significant at the 1% level, \*\* the 5% level, \* the 10% level.

Table 4: Comparing current evacuees to returnees

Independent variable	Hours worked last week	Employed in the previous month
Hurricane Katrina Evacuee	-1.20* (0.629)	-0.035** (0.014)
Returned to pre-Katrina address this month	1.47 (0.919)	0.017 (0.020)
Away from pre-Katrina address this month	-7.31*** (1.06)	-0.183*** (0.024)
Deny evacuee status this month	-0.821 (0.894)	-0.029 (0.020)
Table 3 control variables	Yes	Yes
N	1,401,669	1,402,261
R <sup>2</sup>	0.150	0.112

Note: Standard errors, in parentheses, have been adjusted for the clustering of individual observations. Regressions are estimated as linear models and weighted using CPS cross-sectional weights. Data source is the Current Population Surveys of August 2004 through October 2006. Hurricane Katrina evacuee status is defined in the text.

\*\*\* denotes a coefficient significant at the 1% level, \*\* the 5% level, \* the 10% level.

Table 5: Tracing the impact of evacuation over time

Independent variable	All evacuees		Long-term evacuees	
	Hours worked last week	Employed in the previous month	Hours worked last week	Employed in the previous month
Hurricane Katrina Evacuee	-1.19* (0.629)	-0.035** (0.014)	-1.20* (0.629)	-0.035** (0.014)
Returned to pre-Katrina address this month	---	---	1.47 (0.919)	0.017 (0.020)
Evacuee* November 2005	-3.78*** (1.35)	-0.121*** (0.030)	-10.5*** (2.23)	-0.291*** (0.052)
Evacuee* December 2005	-2.53** (1.29)	-0.092*** (0.028)	-7.45*** (2.34)	-0.229*** (0.049)
Evacuee* January 2006	-2.36* (1.24)	-0.076*** (0.028)	-7.69*** (2.11)	-0.220*** (0.045)
Evacuee* February 2006	-0.930 (1.24)	-0.048* (0.028)	-5.07** (2.39)	-0.159*** (0.054)
Evacuee* March 2006	-2.38* (1.24)	-0.061** (0.029)	-12.8*** (1.83)	-0.285*** (0.048)
Evacuee* April 2006	-1.64 (1.27)	-0.059** (0.028)	-7.73*** (2.40)	-0.178*** (0.057)
Evacuee* May 2006	-1.83 (1.18)	-0.050* (0.026)	-7.39*** (2.12)	-0.178*** (0.051)
Evacuee* June 2006	-0.884 (1.19)	-0.015 (0.027)	-7.22*** (2.15)	-0.145*** (0.049)
Evacuee* July 2006	-0.879 (1.22)	-0.019 (0.027)	-5.94** (2.65)	-0.165*** (0.061)
Evacuee* August 2006	0.693 (1.21)	-0.003 (0.027)	-3.93* (2.06)	-0.067 (0.050)
Evacuee* September 2006	-1.28 (1.21)	-0.033 (0.027)	-7.34*** (2.21)	-0.171*** (0.051)
Evacuee* October 2006	-2.23* (1.26)	-0.055* (0.028)	-5.37** (2.42)	-0.130** (0.055)
Deny evacuee status this month	---	---	-0.821 (0.894)	-0.029 (0.020)
Table 3 control variables	Yes	Yes	Yes	Yes
N	1,401,669	1,402,261	1,401,669	1,402,261
R <sup>2</sup>	0.150	0.112	0.150	0.112

Note: Standard errors, in parentheses, have been adjusted for the clustering of individual observations. Regressions are estimated as linear models and weighted using CPS cross-sectional weights. Data source is the Current Population Surveys of August 2004 through October 2006. Hurricane Katrina evacuee status is defined in the text. \*\*\* denotes a coefficient significant at the 1% level, \*\* the 5% level, \* the 10% level.

Table 6: Comparing evacuee outcomes by destination characteristics

Independent variable	Hours worked last week	Employed in the previous month
Hurricane Katrina Evacuee	-2.34** (1.18)	-0.057** (0.027)
Returned to pre-Katrina address this month	-0.322 (2.16)	0.016 (0.049)
Away from pre-Katrina address	-20.37 (51.77)	-0.871 (1.35)
Away from pre-Katrina address* log of city population	-7.90* (4.38)	-0.164 (0.101)
Away from pre-Katrina address* city growth rate April 2000-July 2005	-0.148 (0.249)	-0.004 (0.006)
Away from pre-Katrina address* log fair market rent 2005	7.83 (9.64)	0.267 (0.254)
Away from pre-Katrina address* log TANF benefit for family of 3, 2005	0.922 (2.70)	0.002 (0.065)
Away from pre-Katrina address* unemployment rate, July 2005	0.134 (0.956)	0.006 (0.023)
Away from pre-Katrina address* log employment in accommodation & food services	5.83 (4.90)	0.103 (0.117)
Away from pre-Katrina address* log distance to New Orleans in miles	0.001 (0.004)	2.33*10 <sup>-5</sup> (1.05*10 <sup>-4</sup> )
Away from pre-Katrina address* log number of Katrina evacuees in MSA	0.536 (1.31)	0.014 (0.032)
Deny evacuee status this month	-3.05** (1.55)	-0.029 (0.020)
Table 3 control variables	Yes	Yes
Main effects for MSA characteristics	Yes	Yes
N	570,007	570,189
R <sup>2</sup>	0.149	0.109

Note: Standard errors, in parentheses, have been adjusted for the clustering of individual observations. Regressions are estimated as linear models and weighted using CPS cross-sectional weights. Data source is the Current Population Surveys of August 2004 through October 2006. Hurricane Katrina evacuee status is defined in the text.

\*\*\* denotes a coefficient significant at the 1% level, \*\* the 5% level, \* the 10% level.



Table 7: The Katrina Effect on March supplement outcomes

Independent variable	Log total income	Log earnings	Weeks worked	Health is excellent
Hurricane Katrina Evacuee	-0.302* (0.179)	-0.144 (0.347)	-0.327 (1.11)	-0.023 (0.024)
Year 2006	-0.008 (0.021)	0.171*** (0.040)	0.562*** (0.128)	3.24*10 <sup>-4</sup> (0.003)
Evacuee*Year 2006	-0.310 (0.227)	-0.311 (0.441)	-3.21** (1.41)	0.044 (0.031)
Female	-0.242*** (0.033)	-0.125** (0.064)	-1.57*** (0.204)	-0.023*** (0.004)
Age	0.105*** (0.007)	0.571*** (0.014)	2.26*** (0.044)	-0.009*** (0.001)
Age squared	-0.001*** (8.02*10 <sup>-5</sup> )	-0.008*** (1.58*10 <sup>-5</sup> )	-0.029*** (4.97*10 <sup>-4</sup> )	2.62*10 <sup>-5</sup> ** (1.09*10 <sup>-5</sup> )
Black	-0.166*** (0.031)	-0.028 (0.059)	-1.45*** (0.190)	-0.045*** (0.004)
Married, spouse present	0.543*** (0.032)	1.14*** (0.063)	4.61*** (0.201)	0.035*** (0.004)
Married, spouse present*female	-1.67*** (0.043)	-2.13*** (0.082)	-7.44*** (0.264)	0.016*** (0.006)
Own children under 5 present	0.289*** (0.034)	0.393*** (0.065)	1.53*** (0.209)	0.027*** (0.005)
Own children under 5 present*female	-0.725*** (0.043)	-1.54*** (0.084)	-5.76*** (0.269)	-0.014** (0.006)
High school graduate	1.27*** (0.033)	2.21*** (0.064)	7.60*** (0.202)	0.056*** (0.004)
At least some college	0.596*** (0.026)	0.926*** (0.049)	2.70*** (0.158)	0.053*** (0.003)
Bachelor's degree	0.477*** (0.029)	0.684*** (0.055)	1.64*** (0.179)	0.095*** (0.004)
Post-graduate degree	0.442*** (0.038)	0.619*** (0.072)	1.22*** (0.234)	0.044*** (0.005)
N	109,401	109,401	109,401	109,401
R <sup>2</sup>	0.025	0.023	0.136	0.062

Note: Standard errors in parentheses. Clustering is not employed in these specifications since there is at most one post-Katrina observation per individual. Sample consists of respondents to the March CPS enumerations of 2005 and 2006 for whom evacuee status can be imputed. Regressions are weighted using CPS individual weights. Total income and earnings specifications are estimated by Tobit; remaining specifications by OLS.

\*\*\* denotes a coefficient significant at the 1% level, \*\* the 5% level, \* the 10% level.

Table 8: March supplement outcomes for returnees and current evacuees

Independent variable	Log total income	Log earnings	Weeks worked	Health is excellent
Hurricane Katrina Evacuee	-0.303* (0.179)	-0.144 (0.347)	-0.328 (1.11)	-0.023 (0.024)
Returned to pre-Katrina address this month	-0.118 (0.300)	0.089 (0.583)	-2.22 (1.86)	0.034 (0.041)
Away from pre-Katrina address this month	-0.461 (0.334)	-2.086*** (0.658)	-9.60*** (2.07)	0.026 (0.045)
Deny evacuee status this month	-0.375 (0.281)	0.372 (0.543)	-0.230 (1.74)	0.062 (0.038)
Table 3 control variables	Yes	Yes	Yes	Yes
N	109,401	109,401	109,401	109,401
R <sup>2</sup>	0.025	0.023	0.136	0.062

Note: Standard errors in parentheses. Clustering is not employed in these specifications since there is at most one post-Katrina observation per individual. Sample consists of respondents to the March CPS enumerations of 2005 and 2006 for whom evacuee status can be imputed. Regressions are weighted using CPS individual weights. Total income and earnings specifications are estimated by Tobit; remaining specifications by OLS.

\*\*\* denotes a coefficient significant at the 1% level, \*\* the 5% level, \* the 10% level.

Table 9: Non-earnings income for current evacuees by location

Independent variable	Log public assistance income	Log private assistance income	Log asset/entitlement income	Log self-employment income
Hurricane Katrina Evacuee	-2.01 (2.23)	1.63 (2.20)	2.40** (1.12)	4.24*** (1.62)
Returned to pre-Katrina address this month	7.52** (3.44)	4.48 (3.74)	2.17 (1.83)	5.62** (2.34)
Away from pre-Katrina address this month	13.74*** (3.09)	1.80 (3.84)	0.479 (2.17)	7.91*** (2.62)
Deny evacuee status this month	9.70*** (3.00)	-1.48 (3.78)	-1.81 (1.96)	2.11 (2.48)
Table 3 control variables	Yes	Yes	Yes	Yes
N	109,401	109,401	109,401	109,401
R <sup>2</sup>	0.025	0.139	0.098	0.009

Note: Standard errors in parentheses. Sample consists of respondents to the March CPS enumerations of 2005 and 2006. Regressions are weighted using CPS individual weights. Public assistance income is defined as the sum of income from unemployment compensation, disability insurance, SSI, and welfare programs. Private assistance income is defined as the sum of income from gifts from friends and relatives, child support, and alimony. Asset and entitlement income is defined as the sum of income from social security benefits, other retirement income, interest, dividends, rent, survivor's benefits, workmen's compensation, and veteran's benefits. Self-employment income is defined as the sum of income from business, farming, hobbies, severance payments, foster care payments, and other sources. All specifications are estimated by Tobit. Clustering is not employed since there is at most one post-Katrina observation per individual.

\*\*\* denotes a coefficient significant at the 1% level, \*\* the 5% level, \* the 10% level.

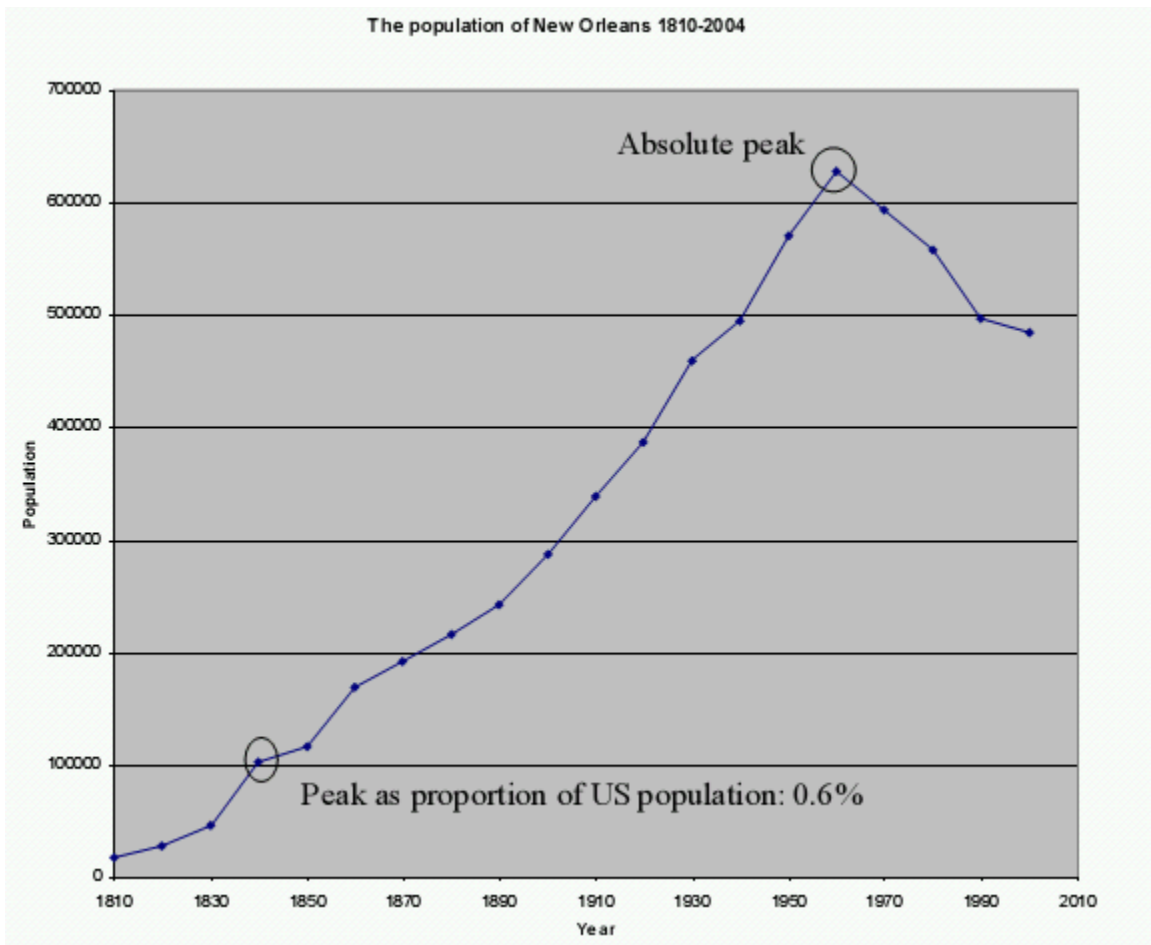


Figure 1

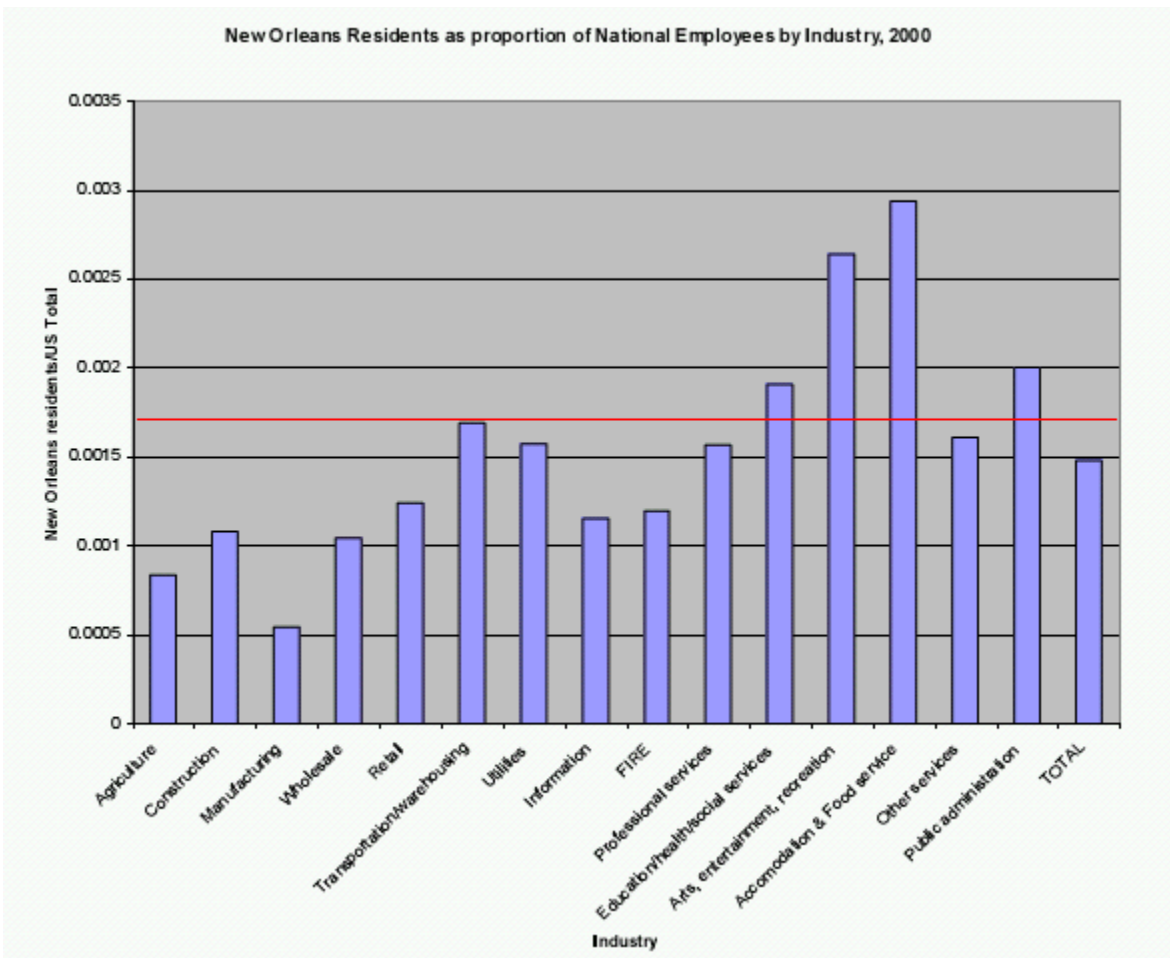


Figure 2