The Economic Impact of Hurricane Katrina on its Victims:

Evidence from Individual Tax Returns

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Abstract

Hurricane Katrina destroyed more than 200,000 homes and led to massive economic and physical dislocation. Using Internal Revenue Service tax return data, we provide the first systematic analysis of the hurricane's long-term economic impact on its victims. We find small and transitory impacts of the disaster on wages, employment, and total income. Remarkably, within a few years, Katrina victims have higher incomes than controls from similar cities that were unaffected by the storm. There is a short run spike in marriage and little impact on either divorce or child bearing. These findings suggest that, at least in developed countries like the United States, dislocation is unlikely to be an important component of the costs of dramatic negative events, such as natural disasters or climate change.

Hurricane Katrina is arguably the most destructive natural disaster ever to strike the United States. The storm killed nearly 2,000 people and destroyed 200,000 homes. Eight years later, the population of New Orleans is nearly 25 percent smaller than before the devastation. Parts of the city have never been rebuilt. Property damage was estimated to be upwards of $100 billion.

Despite the magnitude of the disaster, remarkably little is known about the long-term ramifications for its victims. Existing research has focused primarily on patterns of mobility. Groen and Polivka (2008b), for instance, estimate that approximately 60 percent of evacuees from Louisiana returned to their pre-hurricane addresses before October 2006.[1] Those who did not return were more likely to be black, have lower levels of education, have a low family income, and were unlikely to be homeowners (Groen and Polivka 2010). Those who did return moved a median of two times before 2009 (Geaghan 2011). Several papers have also focused on the effect of Hurricane Katrina on Houston; the influx of Katrina evacuees increased Houston's population by over 3 percent (McIntosh 2008) and is estimated to have decreased wage levels (De Silva 2010, McIntosh 2008).

Much less is known about the economic impact of the disaster on victims, in large part because of data limitations. One source of information is the Bureau of Labor Statistic's Current Population Survey (CPS), which was revised to include questions that identified Katrina evacuees from October 2005 through October 2006 (Cahoon et al. 2006, Groen and Polivka 2008a). The American Housing Survey also added questions related to the hurricane. Other than those two sources, we are not aware of any other publicly available data set that allows

[1] Gregory (2011) estimates that the Louisiana state government's Road Home program, which provided money to residents to rebuild and protect their homes from future storm damage, increased the rate of rebuilding damaged homes by 11 percent.

researchers to identify individuals who were affected by the hurricane and link them to post-Katrina outcomes.[2]

In this paper, we use a previously untapped data source—individual tax returns filed with the Internal Revenue Service (IRS)—to undertake the first systematic analysis of the long-term social and economic consequences of Hurricane Katrina on its victims. Roughly 230 million tax returns are filed annually with the IRS. Included in the returns are home addresses, allowing us to identify those residing in areas affected by Hurricane Katrina before the storm struck. Because the returns contain social security numbers for the primary filer, spouse, and dependents, we are able to link individuals over time. Tax returns contain rich information not only about the sources and amounts of income, but also about mobility and other life changes (births, deaths, marriage, and divorce).

Even with excellent data, empirical challenges remain. Finding a credible comparison group for those affected by Hurricane Katrina is difficult. Ideally, we would compare those hit by the hurricane (the treatment group) to a similar set of people who were unaffected. One strategy would be to select a set of control cities that looked like New Orleans on a range of dimensions prior to the storm. Unfortunately, New Orleans is unique in many ways, making it difficult to find good matches. Additionally, because of the diaspora out of New Orleans in response to the Hurricane, there are potential general equilibrium effects on these other cities. A comparison of New Orleans residents whose homes are directly affected by the flood to those who were spared (e.g. because the homes were built on high ground) suffers from obvious

[2] For example, unlike other recent decennial censuses, the 2010 PUMS survey does not ask respondents where they resided five years earlier. In light of the timing of Hurricane Katrina (September 2005), knowing where people lived in April 2005 (five years prior to the 2010 Census) would have proven invaluable in the study of Katrina's impact.

difficulties as well. We cannot determine systematically which homes were destroyed based on tax return data, for example. Our preferred empirical approach, in light of these difficulties, is to first select US cities that are reasonably similar to New Orleans prior to 2005. We take a 10% random sample of individuals from these cities, calculate propensity scores, and use inverse propensity score weighting in our analysis (Hirano et al. 2003). The richness of our data allows us to use a number of characteristics to construct the propensity score, including age, marriage, employment and homeownership statuses, number of kids, wages, and adjusted gross income for each year between 1999 and 2004. [3]

A number of key results emerge. First, the Hurricane had large and persistent impacts on where people live. Roughly one-fourth of New Orleans residents were displaced by the storm, and five years later they remain geographically dispersed. Second, and more surprisingly, we find small and transitory impacts on the wage earnings and total income of the victims. In 2006, the year after the storm, wage earnings for those in the most badly damaged areas are roughly 13 percent lower than matched pairs drawn from outside of New Orleans. Remarkably, the earnings gap is erased the following year, and four years later, the hurricane victims actually have *higher* wage and total income than the controls. Third, while unemployment in this group spikes after the storm, within a year employment rates match the control group. Four years later, Hurricane Katrina victims are *less* likely to be unemployed. Finally, an increase in marriage is observed immediately after the storm, but we find little long run impact on divorce or childbearing.

Our study sheds light on the determination of appropriate levels of disaster relief and insurance. Property damage from the storm is estimated to have been more than $100 billion. Lost wages in the immediate aftermath of the storm, based on our results, amount to over $5,500

[3] As demonstrated below, our basic findings prove to be quite robust to a wide range of assumptions regarding this procedure.

per tax filer. Direct disaster relief amounted to slightly over $100 billion (Hoople 2013). In addition, per capita unemployment insurance payments in New Orleans skyrocketed from $63 per resident in 2004 to $126 per resident in 2005 and $167 per resident in 2006. It is further estimated that charitable donations related to Hurricane Katrina were upwards of $4.25 billion.[4] While our study cannot precisely identify what would have happened in the absence of this aid, it appears to have been more than adequate to avert harmful long-run effects.

Our results also speak to the appropriate level of *ex ante* mitigation spending (Becker, Murphy, and Topel 2011). The longer the effects of shocks like Hurricane Katrina last, the larger the welfare losses and, correspondingly, the benefit of public mitigation measures, such as investments in stronger levees. The highly transitory nature of the Katrina shock suggests more modest *ex ante* mitigation spending than might otherwise be deemed appropriate.

Lastly, our results have important implications for the debate about climate change. If the predictions of current climate models come true, rising ocean levels and temperatures are likely to lead to substantial population movements in upcoming centuries (Barbieri et al. 2010; Feng, Krueger, & Oppenheimer 2010; and McGranahan, Balk, & Anderson 2007). From a public policy perspective, the investments society is willing to make to avoid those dislocations (e.g. through carbon taxes, geoengineering solutions, or technology to protect existing cities from rising oceans) depends critically on the costs associated with people moving. The economic losses associated with forced dislocation from an unexpected event like Katrina are likely to represent an upper bound on the costs associated with a dislocation that comes with decades of advance notice due, for instance, to rising ocean levels. When shocks are anticipated, individuals

[4] This and other statistics about Hurricane Katrina-related charitable giving are taken from Charity Navigator (http://www.charitynavigator.org/index.cfm/bay/katrina.facts.htm). Hurricane Katrina was a boon to charities: donations to human services organizations in 2005 were 28 percent higher, and 36 percent of 2005 disaster relief donations was made to victims of Hurricanes Katrina and Rita.

can make choices well in advance of the event to mitigate the negative consequences. Given that we find only small long-term effects on victims even from this unexpected catastrophe, we hypothesize that climate-change driven relocation will have minimal economic costs on those affected, at least in a developed economy like the United States.[5]

The remainder of the paper is structured as follows. Section II provides additional background on Hurricane Katrina. Section III describes the data sources used in the analysis, with emphasis on the tax return data. Section IV presents the findings. Section V concludes.

Section II: Background on Hurricane Katrina

Tropical Depression 12 developed on August 23, 2005.[6] It quickly grew in size and strength, and by the following day it was named Tropical Storm Katrina. Katrina developed into a Category 1 hurricane as it traveled northwest across the Bahamas. It first made landfall August 25 on the coast of Florida, causing only a handful of deaths. It then moved westward across the Gulf of Mexico, and at its peak strength was a Category 5 storm with wind speeds clocked at over 170 miles per hour. By the time Katrina reached the Louisiana coast on August 29, it had sustained winds that placed it as a strong Category 3 storm. In New Orleans, wind speeds were well over 100 miles per hour.[7]

[5] Our data are less informative regarding what dislocation costs might be in developing economies. For instance, it is estimated that more than 26 million people in low-lying areas of Bangladesh will be forced to relocate over the next half-century (Bierman and Boas 2010). Additionally, our results come with the caveat that what we observe is conditional on the government aid, insurance, and charitable activities that occurred. The impact on victims absent these resources might have been very different.

[6] The basic facts about Hurricane Katrina cited throughout are from publications of the National Oceanic and Atmospheric Administration.

[7] Meteorologists categorize hurricanes on a scale from 1 to 5. A Category 1 hurricane has wind speeds ranging from 74 to 95 miles per hour, while a Category 5 storm has wind speeds over 155 miles per hour, causing extensive property damage, power outages, and potentially high fatality and injury rates (Schott et al. 2012).

The government realized early on that Katrina had the potential to be the "perfect storm," causing massive wind damage and storm surges. New Orleanians had long known that a direct hit on New Orleans might have catastrophic results. The city is situated largely below sea level, protected from flooding by a system of canals and levees along the Mississippi River to the south and east and Lake Pontchartrain to the north. A breach in the levees would cause massive flooding throughout the area. Once flooded, ridding the city of water would be a massive undertaking becauseNew Orleans sits at the bottom of a bowl-shaped area of land.

New Orleans Mayor Ray Nagin issued a voluntary evacuation order the evening of August 25, four days before the storm struck the Louisiana coast. The following morning, he changed the voluntary evacuation order to the city's first ever mandatory evacuation. President George W. Bush urged residents to prepare for the worst.[8] Two days before landfall, the city converted all highway lanes to outbound. Even so, evacuees faced gridlock.

With all signs pointing toward a catastrophic storm, the great majority of city residents evacuated. Still, nearly 100,000 New Orleans–area residents prepared much as they had done in the past, by boarding their windows, stocking up on nonperishable foods, and throwing hurricane parties.[9]

Katrina reached Louisiana's coast on Monday, August 29. Lake Pontchartrain breached the area's levees. Water pumps and the sewage system couldn't keep up with the deluge, leaving 80% of New Orleans under water. Figure 1 shows a map of the New Orleans area with deeper flooding captured by a darker shade, and median household income denoted with cross-hatching.

[8] And in yet another New Orleans evacuation first, meteorologist Nash Robert's himself left the city; in his over 50 years as the local authority on hurricanes, Roberts had not once evacuated.

[9] In previous years, voluntary evacuations had been called for hurricanes that had caused minimal damage. Just the year before, Hurricane Ivan had fizzled out before reaching Louisiana. What is more, locals thought they had already seen—and survived—the worst, 1965's Hurricane Betsy. A Category 3 storm, Hurricane Betsy killed approximately 75 people in Louisiana and incurred over $10 billion in damage in present-day dollars (Sugg 1966). It was also the reason for New Orleans' supposedly improved levee system—the very system that Katrina breached (*National Geographic News* 2005).

The worst flooding – more than nine feet of standing water occurred near Lake Pontchartrain and in the lower ninth ward, but serious flooding is seen throughout many parts of the city. A few areas of the cities sustained minimal damage; these neighborhoods tended to be relatively affluent.

Nearly 60,000 members of the National Guard were sent to help with rescue and recovery, in an effort that one command sergeant referred to as "far more difficult that anything we faced in Iraq."[10] Soon thereafter, President Bush declared Katrina "one of the worst natural disasters in our nation's history" (*Washington Post* 2005). Statistics back up this statement. Not since the devastating Florida hurricane of 1928 had a natural disaster claimed as many American lives.[11] Katrina ranks as the most expensive storm, causing over $100 billion in damage, more than twice as much as the next storm, Hurricane Andrew (Blake, Landsea, & Gibney 2011). Nearly two years later, over 600,000 individuals had yet to return to their homes in affected areas. Even today, New Orleans's population has returned to only 75 percent of its pre-Katrina population.

Section III: Data and Identification

Our data are drawn from the universe of U.S. federal tax returns filed between 1999 and 2010. These data are housed at the Internal Revenue Service's (IRS) Compliance Data Warehouse (CDW). The CDW contains transcribed data from all individual tax returns and

[10] The PBS NewsHour, September 8, 2005.

[11] This figure doesn't take into account the many other Katrina-related fatalities, including an estimated 600,000 pets and animals that died or were left without shelter, and nearly the entire fish population of the world-renowned New Orleans Aquarium of the Americas (*AP* 2009; *CNN* 2005).

information returns that are filed.[12] In addition, the CDW contains some data from Social Security Administration records.

To construct our sample, we begin by identifying all tax filing units whose tax returns were filed in New Orleans for tax year 2004 (i.e., those that were due to be filed in April 2005) using the filing zip code on IRS Form 1040. Each individual on a tax return has an associated "Tax Identification Number" (TIN) which corresponds to a social security number and can thus be used to track individuals over time.[13] We classify these tax filing units as potential victims of Hurricane Katrina, which hit New Orleans in August 2005. For each household, we collect data from tax records for the years 1999 through 2009. Specifically, we obtain information on the household's income from wages and salaries, business (Schedule C) income or loss, income from unemployment compensation, taxable income, and adjusted gross income from IRS Form 1040. We additionally collect the demographic characteristics that can be obtained from tax records: marital status, number of children at home or away from home, age of the primary filer, and filing address.

As noted earlier, New Orleans is an outlier as a city with a high reliance on tourism, yet low income levels, low employment rates, and a high percentage of black residents. It is difficult, therefore, to construct a compelling control group using city level data.[14] Instead, we turn to propensity score weighting as our primary empirical method (Hirano et al. 2003). This

[12] Information returns are forms that are filed by third parties and are used to verify information reported on tax returns. For example, W2s that are filed by employers that can be used to verify wage and salaries reported on a Form 1040, or 1099-INT/1099-DIV/1099-Gs which provide information on interest income, dividends, and unemployment compensation, respectively.

[13] At this point, we only link households according to the TIN of the primary filer and do not track other people listed on the tax return, such as spouses or dependents.

[14] Consequently, it is difficult to implement, for instance, the synthetic control approach of Abadie et al. (2010) which computes weights for potential control cities such that their weighted average is similar to the treatment group in the pre-period.

methodology allows us to compare the outcomes of individual Hurricane Katrina victims to controls while accounting for differences in their observable characteristics. A closely related method, propensity score matching, where a Hurricane Katrina victim is matched to the control individual with the closest propensity score, yields very similar results (Rosenbaum and Rubin 1983).

We begin the process of control selection by identifying cities that share basic similarities with New Orleans. To choose this set, we focus on three pre-Katrina dimensions: median earnings, the population growth rate, and the percent of population that is black. The first two variables are meant to capture the general economic environment in the household's city of residence. The last variable is important to match on because we do not observe the tax filer's race. If there are race-specific trends and we do not have a sample that is balanced along this dimension, our results may be biased. The set of cities from which we draw matched pairs is presented in Table 1, along with descriptive statistics for these cities.[15] Essentially, these are the blackest, poorest large cities in the United States, but on average they are slightly less black and slightly richer than New Orleans.

Due to the large size of the data, we draw a random 10% sample of 2004 residents in these cities. We then calculate a propensity score using the primary tax filer's age, marriage, employment and homeownership statuses, the number of kids, wages, and adjusted gross income for each year between 1999 and 2004. We then use the inverse of the propensity scores as

[15] To choose a set of cities for the control universe, we start with the universe of American cities with populations over 100,000, compute the within-year differences between each potential control city and New Orleans for the three outcomes mentioned in the previous paragraph. We normalize each outcome by the outcome's standard deviation in that year to make the magnitudes comparable and square the normalized measure to penalize large deviations. For each city, we then compute the sum across the five years and three outcomes to come up with the sum of squared normalized differences from New Orleans. We rank cities according to this measure and select the ten most closely resembling New Orleans. The control cities are listed in Table 1.

weights in our analysis. A key advantage of this method over propensity score matching is that it utilizes the full sample instead of restricting the number of controls to be equal to the number of treated units, thus increasing power. Another important advantage is that propensity score weighting takes into account how similar the control units are to the treated ones. However, as we discuss later, our results are robust to employing one-to-one matching. Our preferred specification also omits individuals whose propensity scores do not have a counterpart in the other group. In other words, we impose the "common support" restriction.

Section IV: Results

Having identified potential controls for the pre-Katrina New Orleans residents in our sample, we run regressions of the form:

$$Y_{it} = \sum_{\tau=1999,\tau\neq2004}^{2009} \beta_\tau * 1[t=\tau] * NOLA_i^{2004} + \alpha_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where *i* indexes households and *t* is the filing year. The variable *Y* corresponds to one of our outcome variables such as adjusted gross income, marital status, etc. $NOLA_i^{2004}$ is an indicator variable that is equal to one if the individual lived in New Orleans in 2004 and zero otherwise. Household- and year- fixed effects are included in the specification. Standard errors are clustered by the household's 2004 zip code. We weight each regression by the inverse of the tax filer's estimated propensity score.

The key coefficients in the specification are the time-varying β's, which capture any systematic gap between the outcomes of those who lived in New Orleans in the year prior to Katrina and the control individuals. If the control group is properly selected, the pre-2005 β's should be close to zero.

The estimated β's and corresponding 95% confidence intervals are presented graphically in Figure 2.[16] Each sub-graph corresponds to a different dependent variable, as printed above each plot. In each case, the year 2004 is the omitted category, so all estimates are relative to that baseline year. We include a vertical line in 2005, which corresponds to the year of Hurricane Katrina. We also add a horizontal line at zero to provide a reference point.

The graph in the upper-left-hand corner of Figure 2 reports results for logged adjusted gross income. Prior to 2005, there is almost no difference between the New Orleans residents and the controls (this close correspondence is essentially mechanical since our propensity score is based on pre-2005 income). In the year of Katrina, the New Orleans residents experience a negative income shock of approximately 6 percent, with the income gap increasing to almost 10 percent in the following year. Remarkably, however, just two years after the storm, the income gap disappears. Indeed, by 2009 incomes are a statistically significant 6.7 percent higher for those hit by the hurricane!

The top middle panel of Figure 2 reports results specifically for wage income (AGI includes other sources of income such as capital gains, dividends, unemployment benefits, etc.). The patterns for wages parallel those for AGI, but are more extreme: in the year following Katrina wages are reduced nearly 15% for storm victims, before quickly rebounding and outpacing the control group by more than 10% by the end of the sample.

The dependent variable in the top right panel is an indicator variable for whether any unemployment benefits where reported on the tax return, which is a proxy for whether anyone in the household is unemployed. The pattern of unemployment qualitatively resembles that of

[16] The corresponding point estimates and standard errors can be found in Appendix Table A1.

income. New Orleans residents experience a 26 percentage point increase in unemployment in 2005, which shrinks to 11 percentage points in 2006. In 2007-2009, this pattern is reversed – New Orleans residents are 2-3 percentage points *less* likely to be unemployed. The differential patterns of income and unemployment in 2005 and 2006 make sense – the 2005 income variables reflect earnings both before and after the storm, which hit in the second half of the year. So the impact of the storm on income is muted in the first year.

The first two pictures in the middle panel of Figure 2 report whether the household moves between cities that year and whether the household resides in the same city as it did in 2004, respectively. An extra one-fourth of New Orleans residents change cities in the year of Katrina, and the New Orleans households are also 8 percentage points more likely to switch cities the following year and 3 percentage points more likely to switch cities in 2007. After that, mobility rates are not statistically significantly different.[17] The middle panel shows that, relative to matched pairs, an extra 25 percent of New Orleans residents have left their city in 2005, but over time, that gap falls roughly in half as people move back to New Orleans.

The next figure reports whether the tax filer is married. An unexpected pattern emerges here, with the Katrina shock associated with an increase in the share of married households that continues to grow over the next few years before stabilizing. The absolute magnitude of the difference is not that large – it reaches about one percentage point – but is statistically significant. To understand the source of this gap, the next two pictures show results corresponding to whether the tax return status changes to be newly married or newly divorced.

[17] The estimated coefficients are nearly identical when we look at movement between zip codes as opposed to between cities, i.e. there is little differential within-city movement of New Orleans residents relative to the controls.

New Orleans residents are more likely to marry in 2005 and 2006, but are not less likely to divorce.

The final graph shows that, in spite of increased marriage rates, there are fewer dependents claimed among New Orleans residents in 2005 and 2006. That gap disappears in 2007. Like the marriage results, the estimated impact is relatively small (0.01 fewer children per household) but is statistically significant. Because Hurricane Katrina struck in August of 2005, the drop in the number of children in that tax filing year cannot correspond to deliberate fertility decisions. However, it could be the result of fewer adoptions, either of related or unrelated children.

Heterogeneity

We explore two key dimensions across which one might expect the impact of the hurricane to be heterogeneous: (1) whether a person's own home was adversely affected by the storm and (2) whether a person is a homeowner.[18]

On the first dimension of heterogeneity (whether a person's home was destroyed by the storm), we cannot directly observe the hurricane's impact on an individual house, but we can use the location of the home as a proxy. We use two measures of being affected directly. On December 9, 2005, FEMA issued an announcement classifying 10 New Orleans zip codes as "look and stay" zip codes, 7 as "look and leave," and 2 had no restrictions.[19] The residents of "look and stay" zip codes were allowed to return to their homes permanently, if they wished. Those who resided in the "look and leave" zip codes prior to Hurricane Katrina could return during the day to conduct repairs as often as they wished but were not allowed to spend the

[18] In the future, we will also consider heterogeneity by pre-Katrina income and by age.

[19] The full text of the announcement can be found on http://www.fema.gov/news-release/residents-17-orleans-parish-zip-codes-may-return-home-inspect-damage.

night. We posit that residents in these zip codes were initially harmed more by Katrina than the rest of New Orleans. We estimate the long-run impact on this group by allowing the effect of Katrina to vary by whether households resided in (a) a "look and stay" or a "look and leave" zip code, or (b) a part of the city that was essentially undamaged.

Figure 3 presents a series of nine pictures similar to those in Figure 2, but dividing the sample of New Orleans residents into two groups: those in "look and leave"/"look and stay" (LAL/LAS) zip codes and all others.[20] The solid lines represent the path of outcomes for LAL/LAS zip codes while the dashed lines correspond to the unaffected zip codes. The square, triangle, and circle symbols represent statistically significant differences between LAL/LAS zip codes and all others, at the 10, 5, and 1 percent level, respectively. The patterns of those living in LAL/LAS zip codes are very similar to the whole sample, which is unsurprising given that they represent the majority of New Orleans residents. Of particular interest in Figure 3 are the results for those living in the relatively unaffected neighborhoods. These individuals experience very little in terms of adverse consequences from the storm. AGI and wage income both fall only by a few percent for these people in 2005 before quickly rebounding and outpacing the control group. Interestingly, although those in badly damaged neighborhoods dip much lower, by the end of the sample AGI and wages for the two groups have converged. In the neighborhoods spared by the storm, there is only a small impact on leaving the city and on marriage; there is no effect on fertility. Where the two groups look most similar is in terms of unemployment. This is understandable because much of the short-term unemployment was driven by the disappearance of tourism and other economic activities, the effects of which were felt across the board.

[20] The point estimates for this figure can be found in Appendix Tables A2 and A3.

Turning to homeowners versus renters, theory suggests a number of reasons why the hurricane's impact might differ across these two groups.[21] First, homeowners may have suffered a greater financial loss from the storm, although this channel is offset by the presence of insurance. Insurance coverage, however, was incomplete and often slow to be paid out. Second, homeowners will tend to be more affluent, older, less mobile, and perhaps to have stronger local social ties. Affluence may ease the difficulty of coping with the shock, while lower mobility may be costly after the storm. Stronger social ties might prove to be a benefit in dealing with the aftermath of the storm (e.g. the opportunity to stay with friends or relatives in the city while rebuilding), or it may be a cost (e.g. because the existing social network had greater value, but was destroyed by the storm, so the loss is larger for those heavily socially invested).

Figure 4 presents the results dividing the sample by homeownership.[22] The patterns for adjusted gross income and unemployment are very similar for the two groups, although the wage declines are smaller for the homeowners. Effects on mobility for homeowners are about one-half as large as for renters, but otherwise exhibit a similar pattern. The impact on marriage is concentrated among homeowners. The immediate negative fertility shock is felt by both groups, but among home-owners it is reversed, whereas for renters fertility remains lower until the end of the sample.

Robustness

One concern is that we are only capturing the effect on those who file tax returns. Figure 5 shows differential non-filing behavior for the whole sample, and by LAL/LAS and homeownership status. Following Hurricane Katrina, New Orleans residents are significantly

[21] We designate a tax filer as a homeowner if he or she takes a home mortgage interest deduction on the tax return. Someone could be a homeowner and misclassified by us if they do not itemize, or if they do not have a mortgage.
[22] The point estimates for Figure 3 can be found in Appendix Tables A4 and A5.

less likely to file a tax return.[23] Non-filing is particularly pronounced among renters and those who lived in LAL/LAS zip codes. The lower filing rate persists until the end of the sample.

To verify that selective filing is not driving our results, we restrict the sample to individuals who file each year. The results for three outcomes, AGI, unemployment, and city of residence, are shown in Figure 6 and closely mirror the previous findings. The top panel shows the estimates for the whole sample. The middle panel shows the differential effects on LAL/LAS versus all other zip codes. Finally, the bottom panel shows the effects by homeownership status. The point estimates and the significance levels are very similar in all cases, including for outcomes not shown in this figure.[24] Thus, selective filing does not appear to be driving our results.

Figure 7 replicates Figure 6 when we use nearest neighbor matching instead of propensity score weighting. Specifically, we match each New Orleans resident with the control individual who has the closest propensity score. We also do not impose the common support restriction. Again, the point estimates and significance levels closely resemble those from our preferred empirical implementation. One significant exception is that we estimate a slight increase in marriage in 2008 and 2009 for the non-LAL/LAS residents. However, given the number of estimated coefficients, this amount of variation in estimates seems reasonable. Our results are also similar if we use Mahalanobis matching, where the pairs are matched using the pre-Katrina characteristics themselves rather than the propensity score.

[23] To calculate the propensity score, we require tax filing units to be present in each year from 1999 through 2004, resulting in literally no pre-period differences between the control and treatment groups.

[24] Two exceptions are that (1) we estimate the number of kids to be significantly lower in 2005 for those not in LAL/LAS zip codes and (2) there is no estimated increase in new marriages for non-homeowners. A full set of point estimates is available upon request.

Finally, Figure 8 shows the estimated effect of Hurricane Katrina if we make no adjustments to the control group, using the full random 10% sample from the ten cities listed in Table 1, and not employing propensity score weighting. Again, the overall results are very similar, with the exception of the "newly married" variable: while in the main sample we estimate a one-time increase in new marriages in 2005, in the unadjusted sample, the estimated increase is persistent. The pre-Katrina estimates in Figure 8 also demonstrate the uniqueness of New Orleans residents: they are more likely to be unemployed in 1999 and 2000 and less likely to be unemployed in 2002 and 2003. They also have lower wage incomes in 1999-2001, are more likely to be married, less likely to move cities, and have more children than the average resident of the ten control cities.

Section IV: What explains higher income and wages for storm victims post-Katrina?

The results presented above are surprising on two dimensions: (1) how small and transitory the income shocks are for the storm victims, and (2) in just a few years the income of those hit by the hurricane actually exceed those of matched controls.

These results stand in stark contrast to studies that track workers over time and find large and long-lasting wage declines following job losses caused by plant closings, sectoral declines, environmental regulation, or other economic shocks (e.g., Ruhm 1991; Jacobson et al. 1993; Schoeni and Dardia 2003; Kodrzycki 2007; von Wachter et al. 2009; Couch and Placzek 2010; Walker 2013). A weather shock like Katrina is, of course, different from these economic shocks, which devalue a worker's industry-specific human capital. Thus, one might plausibly predict

that wages of those hit by the hurricane would eventually equilibrate.[25] What is harder to understand is why income actually *outpaces* the controls.

One possibility is that the income differential reflects increases in the cost of living, i.e. the higher wages do not reflect a real change in the standard of living, but rather, simply compensate for price changes. This could happen through two mechanisms. First, New Orleans may have become a more expensive place to live after the storm. A substantial fraction of the housing stock was destroyed and regulatory restrictions were placed on where new structures could be located and how they needed to be constructed. The reduced supply of housing could induce an increased rental rate on housing if not offset by reduced demand. Second, if New Orleans had a low cost of living before the storm relative to the locations where the displaced New Orleans residents settle, then observed nominal wages might be expected to rise, even though real wages are unchanged.

A second possible explanation for the positive long term impact of Katrina on its victims are large fixed costs of moving. If moving costs (either financial or psychological) are high, then people will rationally forego higher earnings available elsewhere unless the expected benefit of moving is large enough to outweigh the fixed cost. The forced relocation caused by the hurricane required displaced residents to pay the moving costs, leading to higher wages (although potentially lower utility levels). Indeed, Kennan and Walker (2010) estimate these fixed costs of moving to be enormous: roughly $300,000 in their sample. This means that even with reasonable discount rates, a worker might forego $10,000 a year in income if it requires relocation. Thus, the magnitude of the wage increases we see empirically are not completely at

[25] Although, our unscientific poll suggests this is not what economists predict. In conversation, we have asked roughly 20 academic economists what their prediction is regarding the income path of Katrina victims. Virtually every economist has predicted a larger immediate income decline, greater persistence in income losses, and a steady state with permanent income losses.

odds with this mechanism. One prediction of this model is that we should observe higher incomes for people who leave New Orleans, but not necessarily for those who stay.

A third possibility is that the Katrina experience and its aftermath changed people in a fundamental way. For instance, exposure to tragedy might affect a person's values, identity, level of risk aversion, etc. These changes might be associated with a greater commitment to the labor market.[26] One manifestation of this phenomenon might be increased investment in education (which would also be consistent with a story in which the temporary lack of jobs makes the opportunity cost of obtaining education lower). Given the limits of our data, it is not obvious how to convincingly test this hypothesis.

A final explanation for the patterns observed – which again is not easy to test in our data – is that the storm destroyed assets which were not fully insured, which increased the marginal benefit of work. The fact that earnings in neighborhoods that were essentially unaffected by Katrina also outrace earnings in the control group (see Figure 3) provides indirect evidence against this explanation.

Section V: Conclusion

Hurricane Katrina massively and unexpectedly disrupted the lives of New Orleans residents. The local economy essentially shut down, and hundreds of thousands of people were forced out of their homes. It is not surprising that the immediate economic experiences of the storm victims were negative. What is remarkable, however, is the rapidity with which their

[26] Anecdotally, at least, it is said that those who grew up in the Great Depression had a lifelong commitment to frugality.

economic situation recovered. In our data, within just a handful of years, income of those affected by the storm actually surpasses those of a matched control group.

Our results have broader implications for several policy areas. With respect to federal disaster relief, a quick recovery by victims suggests that the federal and state relief programs that were initiated in response to Hurricane Katrina were effective. Alternatively, these results could suggest that less generous benefits are justified relative to a scenario in which earnings slowly (or never) recover from such a shock. If individuals are able to fully insure their assets at actuarially fair prices, and the integral of lifetime wages is unaffected by the disaster (or in the case we study, perhaps the disaster is associated with *higher* lifetime earnings), then it is unclear whether disaster relief is warranted at all.[27] If economic losses are short term, then easy access to loans, rather than cash transfers, could serve as an alternative form of disaster relief.

Finally, our results have implications for the implied costs of climate change. The costs of an unexpected shock like Katrina represent an upper bound on the costs of a disruption of similar magnitude that is anticipated. Given advance warning, appropriate investments can be made in advance of the dislocation. In this respect, our findings should be viewed with optimism. At least for the set of individuals affected by Katrina, the long term economic impact was more favorable than would be expected. No doubt there were enormous non-pecuniary costs borne by the storm's victims; these also would presumably be reduced if change came more gradually, rather than with little warning.

[27] The disaster is almost assuredly associated with a loss of utility, even if income is unaffected. This loss of utility might also justify disaster relief.

Table 1. Summary statistics, New Orleans and control cities

	2000						2005					
	Total population	Median household income, 1999	Employment rate	Median age	% black	% hispanic	Total population	Median household income, 2005	Employment rate	Median age	% black	% hispanic
New Orleans, Louisiana	484,674	$ 31,808.91	57.80%	33.1	67.25%	3.06%	437,186	$ 30,711.00	55.30%	35.2	66.85%	3.13%
All control cities	370,244	$ 34,603.17	59.03%	32.96	64.79%	5.27%	343,381	$ 31,356.90	55.31%	33.7	65.32%	6.99%
Baltimore, Maryland	651,154	$ 35,261.43	56.60%	35	64.34%	1.70%	608,481	$ 32,456.00	56.40%	35.7	64.89%	2.28%
Birmingham, Alabama	242,820	$ 31,342.32	58.60%	34.3	73.46%	1.55%	222,154	$ 27,020.00	55.10%	34.1	75.52%	2.88%
Detroit, Michigan	951,270	$ 34,614.30	56.30%	30.9	81.55%	4.96%	836,056	$ 28,069.00	45.80%	32.5	81.81%	5.62%
Gary, Indiana	102,746	$ 31,881.59	55.90%	33.6	84.03%	4.93%	97,057	$ 25,496.00	47.20%	32.9	82.64%	--
Jackson, Mississippi	184,256	$ 35,655.33	62.20%	31	70.64%	0.79%	163,928	$ 31,177.00	57.50%	31.9	77.42%	--
Memphis, Tennessee	650,100	$ 37,848.77	63.00%	31.9	61.41%	2.97%	642,251	$ 33,244.00	59.90%	33.0	62.91%	4.14%
Newark, New Jersey	273,546	$ 31,551.00	52.70%	30.8	53.46%	29.47%	254,217	$ 30,665.00	56.90%	30.1	50.57%	32.87%
Portsmouth, Virginia	100,565	$ 39,556.86	62.10%	34.5	50.61%	1.74%	95,183	$ 40,172.00	56.50%	35.8	51.73%	1.86%
Richmond, Virginia	197,790	$ 36,484.17	62.40%	33.9	57.19%	2.57%	180,757	$ 34,396.00	61.10%	35.9	55.17%	3.76%
St. Louis, Missouri	348,189	$ 31,835.87	60.50%	33.7	51.20%	2.02%	333,730	$ 30,874.00	56.70%	35.4	50.57%	2.48%

Notes: 2000 and 2005 demographic data are from the 2000 Census and the 2005 American Community Survey. Median household income is calculated in 2005 dollars.

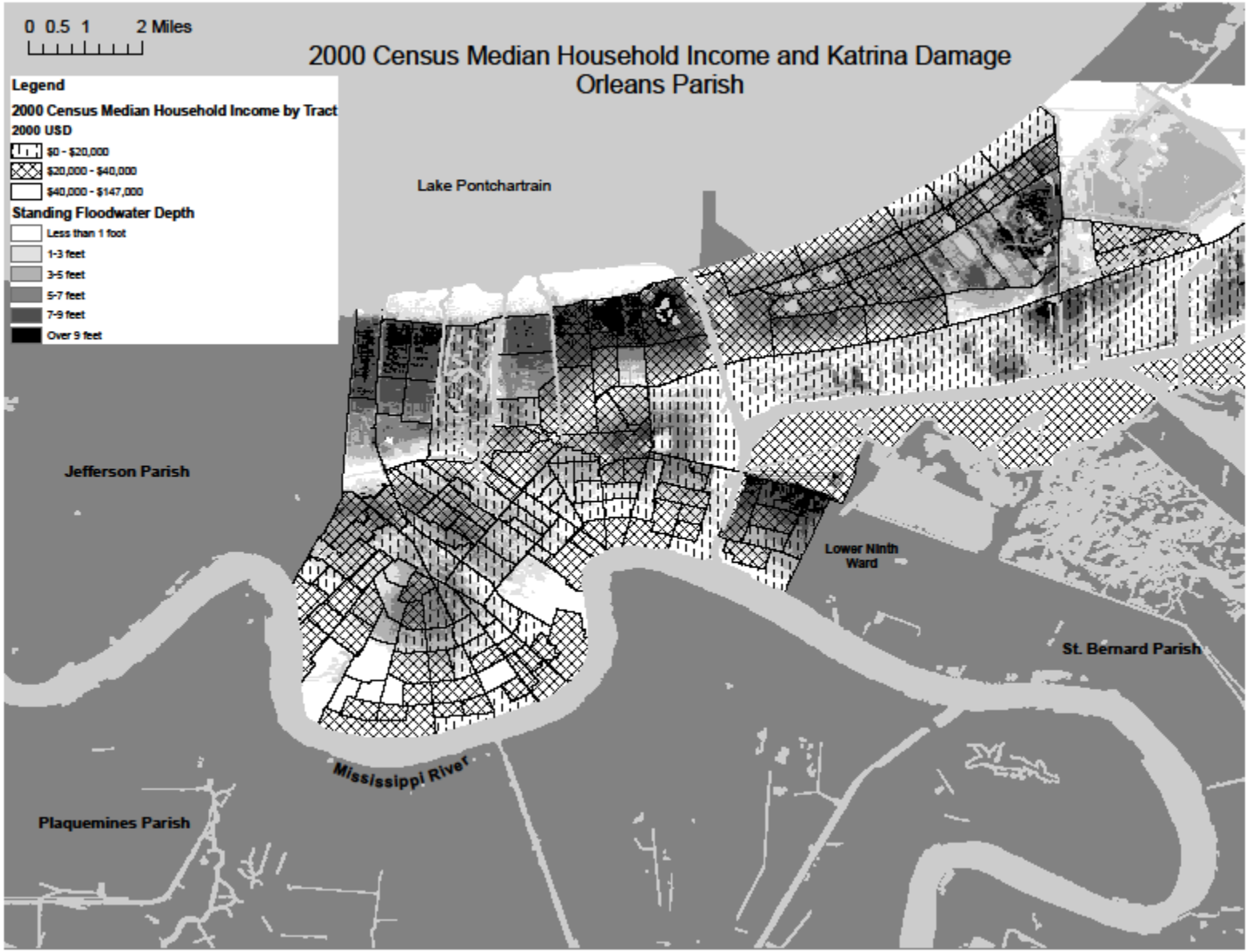
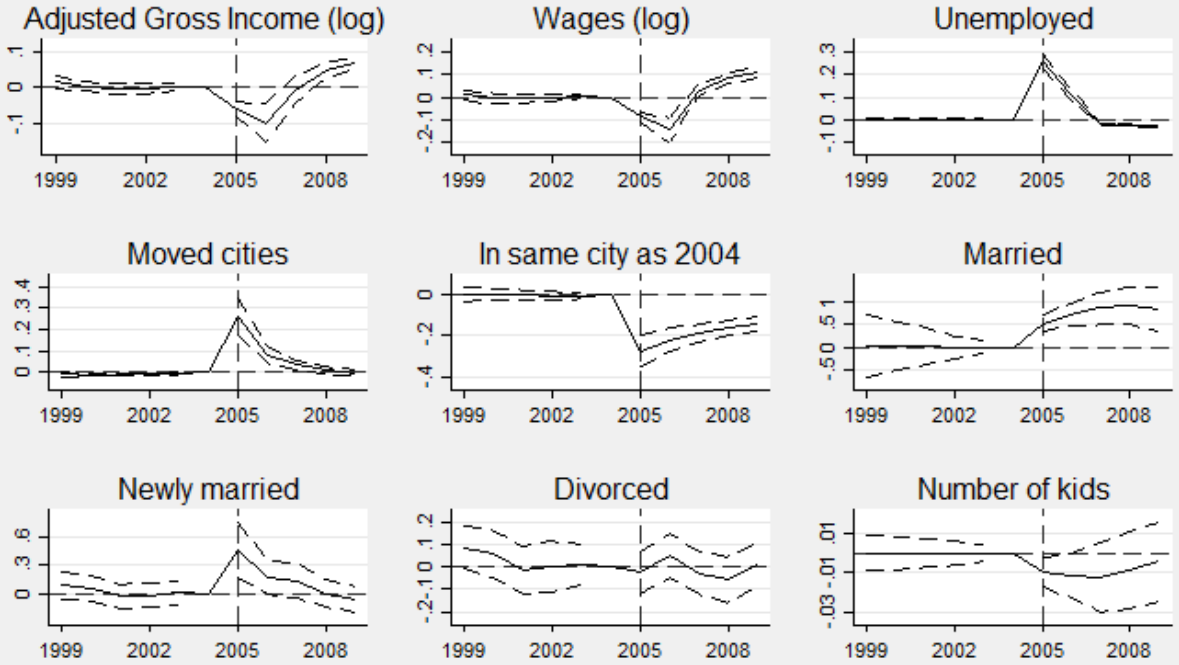
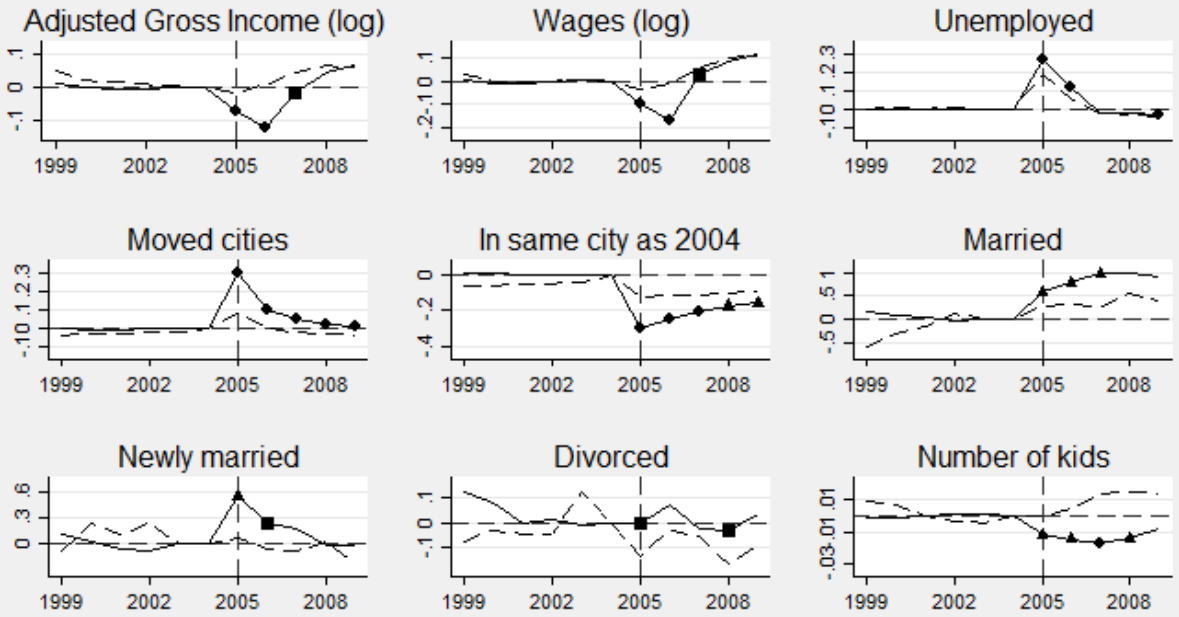

0 0.5 1 2 Miles
2000 Census Median Household Income and Katrina Damage
Orleans Parish
Legend
2000 Census Median Household Income by Tract
2000 USD
$0 - $20,000
$20,000 - $40,000
$40,000 - $147,000
Standing Floodwater Depth
Less than 1 foot
1-3 feet
3-5 feet
5-7 feet
7-9 feet
Over 9 feet
Lake Pontchartrain
Jefferson Parish
Lower Ninth Ward
St. Bernard Parish
Mississippi River
Plaquemines Parish

Figure 2. Effects of Hurricane Katrina, whole sample



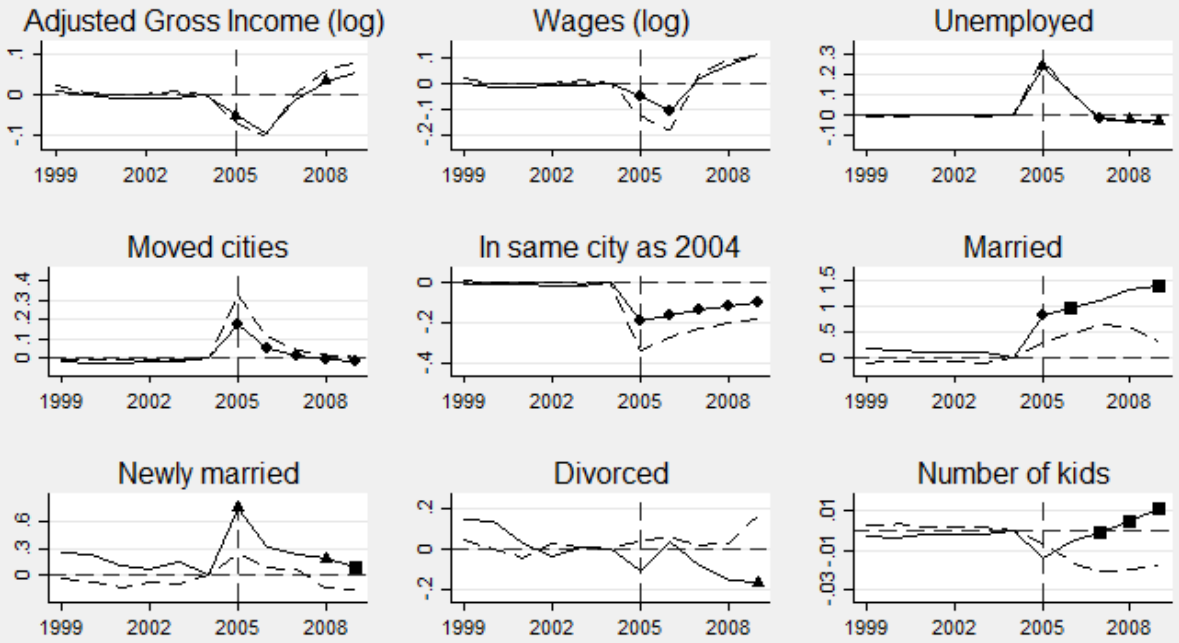
Outcome variable shown above graph. Dashed lines represent 95 percent confidence interval. The estimates for married, newly married, and divorced are scaled by 100.

Figure 3. Heterogeneity by damages



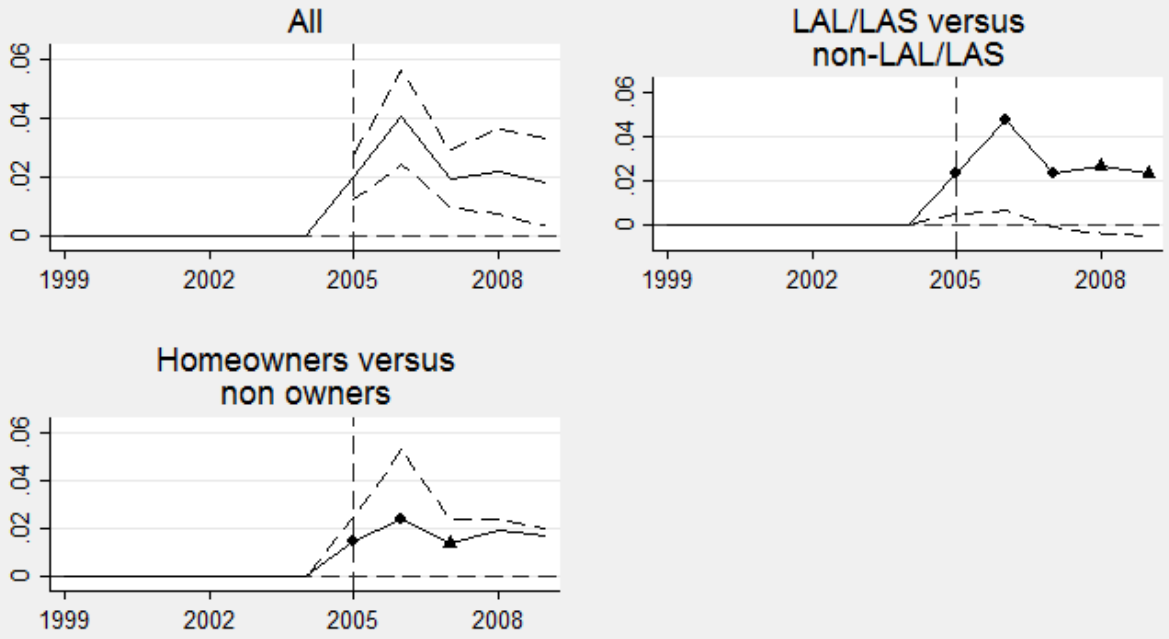
Solid lines denote estimated effect on look-and-leave/look-and-stay zip codes, while dashed lines represent estimated effect on other zip codes. Square, triangle, and circle represent differences at the 10, 5, and 1 percent level, respectively. The estimates for married, newly married, and divorced are scaled by 100.

Figure 4. Heterogeneity by home ownership



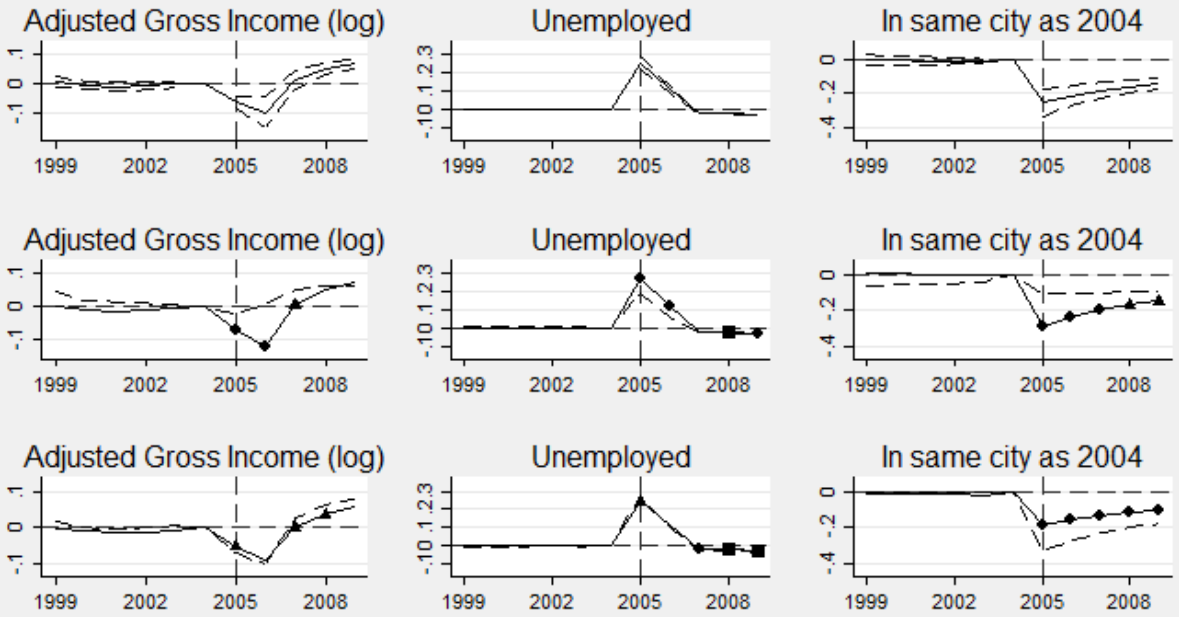
Solid lines denote estimated effect on home owners, while dashed lines represent estimated effect on non home owners. Square, triangle, and circle represent differences at the 10, 5, and 1 percent level, respectively. The estimates for married, newly married, and divorced are scaled by 100.

Figure 5. Effects of Hurricane Katrina on non-filing behavior



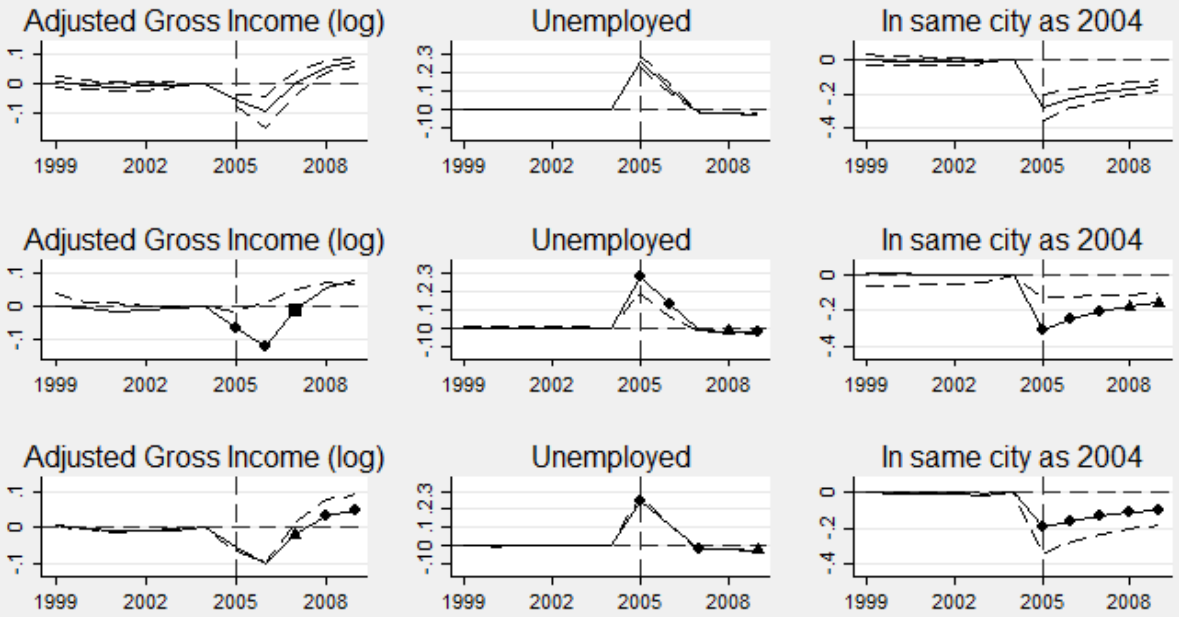
Solid lines denote estimated effect on homeowners and LAL/LAS residents, while dashed lines represent estimated effect on all others. Square, triangle, and circle represent differences at the 10, 5, and 1 percent level, respectively.

Figure 6. Effects of Hurricane Katrina in balanced sample



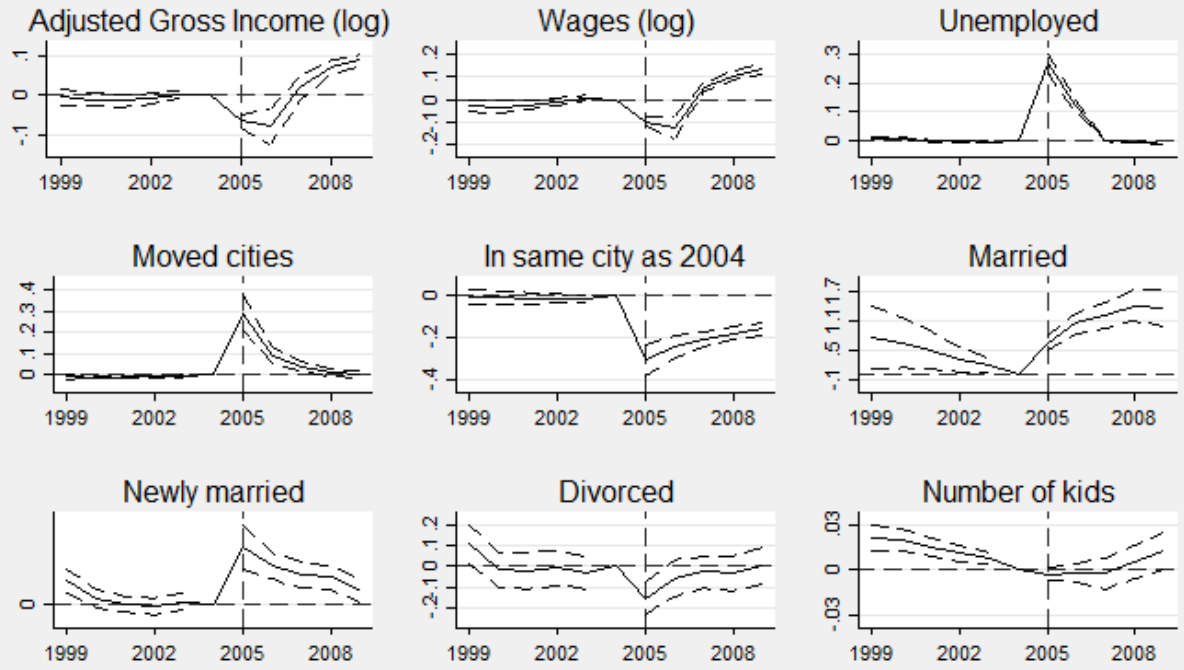
Top panel shows estimated effects for the whole sample. Middle panel shows estimated effect by LAL/LAS status, with the solid line representing LAL/LAS zip codes. Bottom panel shows effect by home ownership status, with the solid line representing home owners. Square, triangle, and circle represent differences at the 10, 5, and 1 percent level, respectively.

Figure 7. Effects of Hurricane Katrina in matched sample



Top panel shows estimated effects for the whole sample. Middle panel shows estimated effect by LAL/LAS status, with the solid line representing LAL/LAS zip codes. Bottom panel shows effect by home ownership status, with the solid line representing home owners. Square, triangle, and circle represent differences at the 10, 5, and 1 percent level, respectively.

Figure 8. Effects of Hurricane Katrina, unadjusted



Outcome variable shown above graph. Dashed lines represent 95 percent confidence interval.
The estimates for married, newly married, and divorced are scaled by 100.

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Appendix Tables

Table A1: Effect of Hurricane Katrina

	AGI (log)	Wages (log)	Unemployed	Moved cities	In 2004 city	Married	Newly married	Divorced	Number of kids
1999	0.017*	0.009	0.000	-0.011	0.000	0.031	0.087	0.087*	0.000
	(0.009)	(0.012)	(0.002)	(0.007)	(0.017)	(0.348)	(0.071)	(0.050)	(0.005)
2000	0.004	-0.007	0.001	-0.014***	-0.003	0.033	0.057	0.056	0.000
	(0.007)	(0.011)	(0.002)	(0.003)	(0.015)	(0.273)	(0.069)	(0.053)	(0.004)
2001	-0.004	-0.007	0.000	-0.013***	-0.006	0.018	-0.027	-0.013	0.000
	(0.007)	(0.009)	(0.002)	(0.003)	(0.013)	(0.210)	(0.064)	(0.055)	(0.004)
2002	-0.002	-0.002	0.001	-0.012***	-0.007	-0.001	-0.019	0.000	0.000
	(0.007)	(0.008)	(0.002)	(0.003)	(0.010)	(0.128)	(0.065)	(0.058)	(0.003)
2003	0.002	0.006	0.000	-0.007**	-0.011	0.000	0.009	0.009	0.000
	(0.006)	(0.005)	(0.001)	(0.003)	(0.007)	(0.076)	(0.065)	(0.046)	(0.002)
2005	-0.060***	-0.089***	0.258***	0.261***	-0.273***	0.533***	0.462***	-0.027	-0.010**
	(0.010)	(0.011)	(0.016)	(0.044)	(0.039)	(0.096)	(0.150)	(0.049)	(0.004)
2006	-0.099***	-0.145***	0.112***	0.082***	-0.222***	0.713***	0.179**	0.050	-0.011*
	(0.028)	(0.028)	(0.012)	(0.020)	(0.029)	(0.126)	(0.090)	(0.049)	(0.006)
2007	-0.006	0.032***	-0.021***	0.031**	-0.188***	0.861***	0.134	-0.028	-0.012
	(0.020)	(0.012)	(0.002)	(0.012)	(0.022)	(0.184)	(0.095)	(0.047)	(0.009)
2008	0.050***	0.084***	-0.023***	0.007	-0.162***	0.915***	0.001	-0.056	-0.009
	(0.011)	(0.013)	(0.001)	(0.009)	(0.018)	(0.210)	(0.074)	(0.052)	(0.010)
2009	0.067***	0.113***	-0.031***	-0.004	-0.144***	0.833***	-0.059	0.011	-0.004
	(0.008)	(0.013)	(0.002)	(0.008)	(0.016)	(0.241)	(0.067)	(0.047)	(0.010)
Dep. var. mean	10.311	10.149	0.065	0.072	0.855	29.347	1.224	0.859	0.657
Observations	2,983,387	2,584,483	3,022,255	3,022,148	3,020,679	3,022,255	3,022,132	3,022,133	3,022,255
R-squared	0.045	0.032	0.069	0.072	0.126	0.007	0.002	0.001	0.005
F-test of pre-trends (p-value)	0.000	0.000	0.985	0.000	0.000	1.000	0.476	0.409	1.000

Robust standard errors (clustered by 2004 zip code) in parentheses. Significance levels: * 10 percent, ** 5 percent, *** 1 percent. Omitted category is year 2004. The estimates for "married", "newly married", and "divorced" are scaled by 100.

Table A2: Effect of Hurricane Katrina on LAL/LAS zip code residents

	AGI (log)	Wages (log)	Unemployed	Moved cities	In 2004 city	Married	Newly married	Divorced	Number of kids
1999	0.011	0.005	-0.001	-0.005	0.012	0.151	0.118	0.119**	-0.002
	(0.010)	(0.014)	(0.002)	(0.006)	(0.018)	(0.376)	(0.075)	(0.048)	(0.005)
2000	0.000	-0.008	0.000	-0.011***	0.008	0.102	0.023	0.072	-0.001
	(0.008)	(0.012)	(0.002)	(0.002)	(0.015)	(0.302)	(0.074)	(0.053)	(0.005)
2001	-0.008	-0.008	-0.001	-0.009***	0.004	0.053	-0.056	-0.006	0.000
	(0.008)	(0.010)	(0.002)	(0.001)	(0.013)	(0.230)	(0.070)	(0.060)	(0.004)
2002	-0.005	-0.002	0.000	-0.008***	0.001	-0.026	-0.070	0.010	0.001
	(0.008)	(0.008)	(0.002)	(0.002)	(0.010)	(0.145)	(0.065)	(0.054)	(0.003)
2003	0.001	0.006	0.000	-0.003***	-0.005	-0.001	0.010	-0.014	0.001
	(0.006)	(0.006)	(0.001)	(0.001)	(0.006)	(0.086)	(0.073)	(0.048)	(0.002)
2005	-0.069***	-0.100***	0.272***	0.298***	-0.304***	0.581***	0.542***	-0.006	-0.012***
	(0.009)	(0.010)	(0.016)	(0.043)	(0.038)	(0.102)	(0.159)	(0.049)	(0.004)
2006	-0.122***	-0.173***	0.124***	0.100***	-0.245***	0.794***	0.226**	0.066	-0.015**
	(0.027)	(0.025)	(0.011)	(0.019)	(0.028)	(0.119)	(0.089)	(0.050)	(0.006)
2007	-0.016	0.026**	-0.021***	0.042***	-0.204***	0.984***	0.179*	-0.023	-0.018*
	(0.021)	(0.013)	(0.002)	(0.011)	(0.022)	(0.164)	(0.096)	(0.049)	(0.010)
2008	0.046***	0.082***	-0.023***	0.015*	-0.174***	0.991***	-0.006	-0.034	-0.014
	(0.013)	(0.014)	(0.002)	(0.008)	(0.018)	(0.213)	(0.081)	(0.055)	(0.011)
2009	0.068***	0.114***	-0.030***	0.004	-0.154***	0.922***	-0.023	0.032	-0.008
	(0.009)	(0.015)	(0.002)	(0.006)	(0.016)	(0.248)	(0.068)	(0.049)	(0.012)
Dep. var. mean	10.311	10.149	0.065	0.072	0.855	29.3	29.347	1.224	0.859
Observations	2,983,387	2,584,483	3,022,255	3,022,091	3,020,641	3,022,255	3,022,132	3,022,133	3,022,255
R-squared	0.045	0.032	0.071	0.076	0.132	0.007	0.002	0.001	0.005
F-test of pre-trends (p-value)	0.000	0.000	0.999	0.000	0.000	0.859	0.277	0.104	0.897

Robust standard errors (clustered by 2004 zip code) in parentheses. Significance levels: * 10 percent, ** 5 percent, *** 1 percent. Omitted category is year 2004. The estimates for "married", "newly married", and "divorced" are scaled by 100. Estimates from Tables A2 and A3 are from the same regression and are split up for readability.

Table A3: Effect of Hurricane Katrina on non-LAL/LAS zip code residents

	AGI (log)	Wages (log)	Unemployed	Moved cities	In 2004 city	Married	Newly married	Divorced	Number of kids
1999	0.050***	0.031**	0.004	-0.041***	-0.063***	-0.573	-0.071	-0.075	0.008
	(0.008)	(0.013)	(0.003)	(0.007)	(0.014)	(0.513)	(0.079)	(0.052)	(0.010)
2000	0.021***	0.000	0.006**	-0.029***	-0.058***	-0.317	0.231***	-0.029	0.007
	(0.007)	(0.013)	(0.003)	(0.006)	(0.012)	(0.392)	(0.075)	(0.094)	(0.010)
2001	0.017**	-0.002	0.004	-0.030***	-0.054***	-0.159	0.115	-0.047	0.000
	(0.008)	(0.012)	(0.003)	(0.008)	(0.010)	(0.363)	(0.078)	(0.065)	(0.007)
2002	0.010	0.001	0.006**	-0.027***	-0.048***	0.123	0.239***	-0.047	-0.004
	(0.012)	(0.010)	(0.003)	(0.006)	(0.008)	(0.196)	(0.072)	(0.165)	(0.003)
2003	0.004	0.005	0.004**	-0.028***	-0.041***	0.004	0.007	0.122	-0.004
	(0.007)	(0.008)	(0.002)	(0.006)	(0.007)	(0.074)	(0.079)	(0.111)	(0.003)
2005	-0.015*	-0.033**	0.187***	0.078*	-0.120***	0.291***	0.068	-0.132*	0.000
	(0.009)	(0.013)	(0.015)	(0.040)	(0.034)	(0.110)	(0.175)	(0.068)	(0.002)
2006	0.007	-0.013	0.056***	-0.005	-0.115***	0.319*	-0.049	-0.030	0.004
	(0.027)	(0.027)	(0.012)	(0.019)	(0.029)	(0.188)	(0.142)	(0.081)	(0.006)
2007	0.043*	0.058***	-0.022***	-0.024*	-0.110***	0.260	-0.083	-0.052	0.013*
	(0.025)	(0.014)	(0.002)	(0.012)	(0.027)	(0.323)	(0.156)	(0.080)	(0.007)
2008	0.065***	0.096***	-0.026***	-0.034***	-0.103***	0.540	0.034	-0.163**	0.015
	(0.008)	(0.011)	(0.002)	(0.012)	(0.024)	(0.364)	(0.131)	(0.065)	(0.010)
2009	0.063***	0.111***	-0.037***	-0.041***	-0.095***	0.394	-0.229*	-0.090	0.014
	(0.009)	(0.013)	(0.002)	(0.012)	(0.023)	(0.370)	(0.129)	(0.093)	(0.012)
Dep. var. mean	10.311	10.149	0.065	0.072	0.855	29.3	29.347	1.224	0.859
Observations	2,983,387	2,584,483	3,022,255	3,022,091	3,020,641	3,022,255	3,022,132	3,022,133	3,022,255
R-squared	0.045	0.032	0.071	0.076	0.132	0.007	0.002	0.001	0.005
F-test of pre-trends (p-value)	0.000	0.000	0.131	0.000	0.000	0.000	0.000	0.050	0.073
LAL/LAS=other in 2005 (pval)	0.000	0.000	0.000	0.000	0.000	0.030	0.039	0.056	0.015
LAL/LAS=other in 2006 (pval)	0.001	0.000	0.000	0.000	0.002	0.014	0.081	0.236	0.019
LAL/LAS=other in 2007 (pval)	0.069	0.082	0.764	0.000	0.006	0.030	0.134	0.708	0.007
LAL/LAS=other in 2008 (pval)	0.171	0.324	0.169	0.001	0.017	0.244	0.781	0.067	0.042
LAL/LAS=other in 2009 (pval)	0.640	0.847	0.001	0.001	0.032	0.189	0.121	0.196	0.167

Robust standard errors (clustered by 2004 zip code) in parentheses. Significance levels: * 10 percent, ** 5 percent, *** 1 percent. Omitted category is year 2004. The estimates for "married", "newly married", and "divorced" are scaled by 100. Estimates from Tables A2 and A3 are from the same regression and are split up for readability.

Table A4: Effect of Hurricane Katrina on homeowners

	AGI (log)	Wages (log)	Unemployed	Moved cities	In 2004 city	Married	Newly married	Divorced	Number of kids
1999	0.008	-0.003	0.003	-0.019***	-0.009	0.180	0.259**	0.139*	-0.003
	(0.010)	(0.013)	(0.002)	(0.006)	(0.016)	(0.541)	(0.106)	(0.077)	(0.015)
2000	-0.001	-0.016	0.005**	-0.022***	-0.010	0.155	0.226**	0.130	-0.004
	(0.008)	(0.012)	(0.002)	(0.003)	(0.013)	(0.406)	(0.106)	(0.102)	(0.013)
2001	-0.007	-0.014	0.001	-0.020***	-0.013	0.121	0.113	0.026	-0.002
	(0.008)	(0.010)	(0.002)	(0.003)	(0.011)	(0.314)	(0.116)	(0.083)	(0.010)
2002	-0.008	-0.005	0.002	-0.017***	-0.015	0.097	0.060	-0.037	-0.002
	(0.009)	(0.008)	(0.002)	(0.003)	(0.009)	(0.197)	(0.123)	(0.090)	(0.007)
2003	-0.007	-0.003	0.003*	-0.012***	-0.019***	0.121	0.153	0.010	-0.002
	(0.006)	(0.005)	(0.002)	(0.003)	(0.006)	(0.117)	(0.096)	(0.081)	(0.004)
2005	-0.050***	-0.052***	0.242***	0.174***	-0.193***	0.829***	0.756***	-0.106	-0.014**
	(0.010)	(0.012)	(0.018)	(0.041)	(0.036)	(0.181)	(0.240)	(0.090)	(0.007)
2006	-0.097***	-0.105***	0.112***	0.049**	-0.161***	0.984***	0.305**	0.038	-0.005
	(0.031)	(0.030)	(0.013)	(0.019)	(0.027)	(0.235)	(0.136)	(0.102)	(0.009)
2007	-0.013	0.021	-0.015***	0.014	-0.135***	1.136***	0.240	-0.081	-0.001
	(0.024)	(0.018)	(0.002)	(0.012)	(0.020)	(0.314)	(0.147)	(0.081)	(0.013)
2008	0.034**	0.069***	-0.020***	-0.007	-0.116***	1.320***	0.183	-0.151	0.005
	(0.015)	(0.018)	(0.002)	(0.009)	(0.017)	(0.355)	(0.122)	(0.111)	(0.015)
2009	0.053***	0.113***	-0.027***	-0.017**	-0.102***	1.422***	0.077	-0.163*	0.011
	(0.012)	(0.018)	(0.002)	(0.007)	(0.016)	(0.409)	(0.102)	(0.097)	(0.016)
Dep. var. mean	10.311	10.149	0.065	0.072	0.855	29.347	1.224	0.859	0.657
Observations	2,983,387	2,584,483	3,022,255	3,022,091	3,020,641	3,022,255	3,022,132	3,022,133	3,022,255
R-squared	0.050	0.042	0.070	0.077	0.135	0.008	0.002	0.001	0.006
F-test of pre-trends (p-value)	0.000	0.001	0.014	0.000	0.000	0.888	0.056	0.362	0.976

Robust standard errors (clustered by 2004 zip code) in parentheses. Significance levels: * 10 percent, ** 5 percent, *** 1 percent. Omitted category is year 2004. The estimates for "married", "newly married", and "divorced" are scaled by 100. Estimates from Tables A4 and A5 are from the same regression and are split up for readability.

Table A5: Effect of Hurricane Katrina on non-homeowners

	AGI (log)	Wages (log)	Unemployed	Moved cities	In 2004 city	Married	Newly married	Divorced	Number of kids
1999	0.025*	0.021	-0.002	-0.004	0.007	-0.086	-0.047	0.047	0.002
	(0.013)	(0.016)	(0.002)	(0.008)	(0.020)	(0.197)	(0.071)	(0.053)	(0.006)
2000	0.007	0.002	-0.003	-0.008***	0.003	-0.063	-0.072	-0.002	0.003
	(0.010)	(0.014)	(0.002)	(0.003)	(0.018)	(0.188)	(0.092)	(0.053)	(0.005)
2001	-0.001	-0.001	0.000	-0.007**	0.000	-0.062	-0.136*	-0.043	0.002
	(0.009)	(0.012)	(0.002)	(0.004)	(0.015)	(0.161)	(0.080)	(0.068)	(0.004)
2002	0.003	0.001	0.000	-0.007**	-0.001	-0.077	-0.079	0.029	0.001
	(0.007)	(0.010)	(0.002)	(0.003)	(0.012)	(0.121)	(0.074)	(0.057)	(0.003)
2003	0.008	0.014**	-0.002	-0.004	-0.004	-0.093	-0.102	0.008	0.001
	(0.006)	(0.007)	(0.002)	(0.003)	(0.008)	(0.086)	(0.077)	(0.055)	(0.002)
2005	-0.069***	-0.120***	0.270***	0.332***	-0.337***	0.294***	0.231**	0.037	-0.007**
	(0.011)	(0.012)	(0.016)	(0.045)	(0.039)	(0.077)	(0.107)	(0.057)	(0.003)
2006	-0.102***	-0.180***	0.113***	0.109***	-0.273***	0.494***	0.091	0.057	-0.016***
	(0.028)	(0.029)	(0.011)	(0.020)	(0.029)	(0.136)	(0.100)	(0.054)	(0.006)
2007	0.000	0.037***	-0.027***	0.044***	-0.232***	0.644***	0.057	0.017	-0.021**
	(0.022)	(0.014)	(0.002)	(0.012)	(0.022)	(0.189)	(0.076)	(0.069)	(0.009)
2008	0.062***	0.092***	-0.026***	0.018*	-0.201***	0.586**	-0.140*	0.024	-0.020**
	(0.013)	(0.014)	(0.002)	(0.009)	(0.018)	(0.252)	(0.078)	(0.050)	(0.009)
2009	0.078***	0.109***	-0.034***	0.007	-0.179***	0.340	-0.160**	0.163**	-0.018*
	(0.011)	(0.016)	(0.002)	(0.008)	(0.016)	(0.312)	(0.073)	(0.066)	(0.010)
Dep. var. mean	10.311	10.149	0.065	0.072	0.855	29.347	1.224	0.859	0.657
Observations	2,983,387	2,584,483	3,022,255	3,022,091	3,020,641	3,022,255	3,022,132	3,022,133	3,022,255
R-squared	0.050	0.042	0.070	0.077	0.135	0.008	0.002	0.001	0.006
F-test of pre-trends (pval)	0.000	0.000	0.492	0.001	0.000	0.895	0.593	0.761	0.967
Owner=non-owner in 2005 (pval)	0.040	0.000	0.012	0.000	0.000	0.004	0.010	0.195	0.209
Owner=non-owner in 2006 (pval)	0.721	0.000	0.869	0.000	0.000	0.082	0.176	0.874	0.213
Owner=non-owner in 2007 (pval)	0.391	0.299	0.000	0.000	0.000	0.177	0.210	0.396	0.074
Owner=non-owner in 2008 (pval)	0.022	0.173	0.036	0.000	0.000	0.117	0.029	0.171	0.067
Owner=non-owner in 2009 (pval)	0.105	0.835	0.023	0.000	0.000	0.057	0.056	0.015	0.058

Robust standard errors (clustered by 2004 zip code) in parentheses. Significance levels: * 10 percent, ** 5 percent, *** 1 percent. Omitted category is year 2004. The estimates for "married", "newly married", and "divorced" are scaled by 100. Estimates from Tables A4 and A5 are from the same regression and are split up for readability.