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# A Perfect Storm? Disasters and Evictions

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**ABSTRACT**

Stable housing is a fundamental platform for individual and collective well-being, and research indicates that a significant disruptive effect of severe environmental disasters is residential displacement. Despite extensive research on the intersection of disasters and housing, the effect of major disasters on evictions remains understudied. How do landlords and renters respond to the economic dislocation that accompanies disasters and to what extent do major disasters lead to evictions? To answer these questions, we adopt a mixed methods approach. Analyzing county-level data on evictions and disasters between 2000 and 2016, we find that disasters are associated with significant increases in evictions in the year of a disaster and the two years following a disaster and that increases in the housing cost burden are associated with higher eviction rates. We complement these quantitative findings with qualitative interviews and archival analysis from Panama City, Florida in the year after Hurricane Michael. The qualitative findings suggest that eviction dynamics may differ by landlord size and identify challenges for small landlords accessing federal assistance, particularly because of clouded titles from unrecorded property transfers. Together, the findings indicate that disasters increase evictions and lead to significant disruption for many low-income tenants for years after the disaster.

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As increasingly severe environmental disasters batter communities across the United States, low-income renters also face crushing housing cost burdens. These disasters frequently damage a substantial portion of the housing stock and displace households temporarily or permanently (e.g., FEMA, 2018). They also cause widespread economic disruption. What effects do major disasters have on evictions?

Since the 1970s, median gross rents have increased faster than median household incomes, leaving renters paying a larger and larger share of their income toward housing costs (Joint Center for Housing Studies, 2019). In 2018, nearly one of every two renter households paid more than 30% of their income toward rent, and more than one of every five renter households paid more than half of their income to rent (Joint Center for Housing Studies, 2020). This high cost of rental housing has put renters in an increasingly precarious position, often just one paycheck away from falling behind on rent. When households fall behind, landlords frequently seek to evict.

At the same time, climate change is contributing to more severe disasters across the world (Field et al., 2014). Understanding a disaster as the realization of an ongoing weather-related risk or hazard in a way that involves social and economic loss and disruption (Arcaya et al. 2020; Tierney, 2019), we focus here on severe disasters defined as the top 5% by property damage of county-level events that received Presidential Disaster Declarations.[1]

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From Category 5 hurricanes to flooding from sea-level rise to gigafires, the value of losses from severe weather or climate-related disasters in the United States over the past several years has been unprecedented (National Centers for Environmental Information [NOAA], 2021). Disasters from 2015 to 2017 alone, primarily hurricanes, wildfires, and coastal or riverine flooding, extensively damaged more than 500,000 units of rental housing and displaced 324,000 renters (FEMA, 2018; Joint Center for Housing Studies, 2020; NOAA 2021; Perls, 2020).

What effects do those types of environmental disasters that are likely to have the biggest effects on the housing stock, such as fires, hurricanes, and floods, have on evictions? Despite extensive research on disasters and on evictions, less work has explored the intersection of the two. How do renters and landlords respond to the economic dislocation that accompanies disasters, and to what extent do disasters contribute to the precarity of low-income renters by leading to evictions?

This article makes three main contributions to the existing literature. First, it draws on county-level data regarding evictions and environmental disasters from 2000 to 2015 and uses the exogenous timing of disasters to present the first quantitative analysis of the effects of disasters on eviction filings and completed evictions nationwide. Second, it examines how local housing market characteristics and levels of federal assistance to renters mediate the relationships between disasters and evictions. Third, it combines the quantitative analysis with a qualitative analysis of semistructured interviews and a case study of the experience of Panama City, Florida, after Hurricane Michael in 2018 to better understand the experiences of property owners and renters after disasters and the dynamics on the ground.

## 1. Literature Review

### *1.1. Housing Stability*

Stable housing is a central platform for the physical, social, and economic well-being of individuals and households (Bratt, 2002; National Academies of Sciences, Engineering, and Medicine, 2018). Housing instability can be created through high housing costs relative to income, poor housing quality, overcrowded housing, neighborhood instability, eviction, foreclosure, and homelessness, among other catalysts; this instability is associated with negative outcomes on adults' and children's physical and mental health (Burgard, Seefeldt, & Zelner, 2012; Currie & Tekin, 2015; Desmond & Kimbro, 2015; Sandel et al., 2018), as well as job loss and other material hardship (Desmond & Gershenson, 2016). Yet housing stability is currently a pressing structural problem in housing markets across the United States (Collinson, Ellen, & Ludwig, 2016; Desmond & Perkins, 2016). New rental construction in recent years has overwhelmingly targeted high-income renters, leaving a diminishing supply of low-cost rental units (Joint Center for Housing Studies, 2020). Two of every five renter households in 2019 paid more than 35% of their gross income for rent, leaving little residual income for other household necessities (U.S. Census Bureau, 2020). Nearly one of every five renter households (roughly 8 million households) paid more than half of their income to rent Department of Housing and Urban Development, 2020). For every 100 households with incomes at or below the area median income, there were only 59 units affordable to them, on average (Department of Housing and Urban Development, 2020).

Rising housing costs and growing housing instability manifest most visibly in formal eviction filings and evictions, legal actions in which property owners seek court authorization to eject tenants from the housing unit (eviction filing) and ultimately succeed in using the power of the state to remove tenants and their belongings and retake possession of the property (eviction) (Desmond, 2016). Property owners filed more than 2.4 million eviction actions in court rooms across the United States in 2016, leading to more than 898,000 evictions (The Eviction Lab, 2018). Many eviction filings are settled out of court before proceedings are complete, often with tenants agreeing to move or agreeing to a probationary repayment plan. With 41.6 million renter households nationwide in 2016, there was one eviction filing for every 17 renter households. Data about informal evictions, in which property owners tell tenants to move or refuse to renew a lease without either party pursuing any action in

court, are hard to come by, but existing research suggests these are even more common than formal evictions (Desmond, 2016). Altogether, existing data about the rates of formal and informal evictions suggest that millions of households face significant challenges in maintaining a stable home.

Research on evictions over the past decade has shed light on the communities that are most affected by evictions and their consequences for families. Multiple studies have found that even after controlling for neighborhood economic characteristics, evictions disproportionately affect neighborhoods with higher shares of Black residents (e.g., Immergluck, Ernsthausen, Earl, & Powell, 2020; Raymond, Duckworth, Miller, Lucas, & Pokharel, 2018; Robinson & Steil, 2021; Teresa, 2018). Families with children are more likely to be evicted than those without (Desmond & Gershenson, 2017). Households commonly face dramatic increases in financial strain in the 2 years before an eviction filing, reflected in declining credit scores, rising balances in collections, decreases in expenditures on durable goods, and an increase in resorting to high-cost payday loans (Humphries, Mader, Tannenbaum, & van Dijk, 2019).

Housing instability broadly, and evictions in particular, are correlated with negative economic and health consequences for families subject to them. One common consequence of evictions is difficulty finding future housing, because landlords sometimes use records of eviction filings or completed evictions to disqualify applicants. These obstacles contribute to accelerated, reactive residential moves that drive low-income families into worse residential conditions and increased housing instability (DeLuca & Jang-Trettien, 2020; Deluca, Wood, & Rosenblatt, 2019). Linking individuals appearing in housing court eviction proceedings to administrative data on homeless shelter applications, hospitalizations, employment, earnings, and receipt of public benefits, Collinson and Reed (2019) find that evictions quintuple the probability of applying to a homeless shelter. These effects persist for years, suggesting that eviction creates a durable difference in the likelihood of homelessness over the long term. Eviction also reduces earnings (Collinson & Reed, 2019) and negatively impacts credit access and durable consumption, although the effects are modest relative to the financial strain experienced leading up to an eviction filing (Humphries et al., 2019).

Evictions also substantially worsen measures of overall health for evicted individuals and increase the likelihood of hospitalization over the two years following an eviction (Collinson & Reed, 2019). Using data on housing instability associated with the foreclosure crisis, Currie and Tekin (2015) find that increases in foreclosures are also associated with negative health outcomes, including increases in hospital visits for mental health problems, heart attacks, strokes, and hypertension. Looking at multiple types of housing instability, moves made because of high housing costs, delinquent housing payments, foreclosure, and homelessness are all associated with poorer health outcomes (Burgard et al., 2012). Being behind on rent in the past year, having made two or more moves in the past year, or a child ever having been homeless are all also significantly associated with negative outcomes for both caregivers and children, including material hardship, poor caregiver health, maternal depression, poor child health, and child lifetime hospitalizations (Sandel et al., 2018).

In short, low-income renters face substantial housing cost burdens and housing instability, including risk of eviction. Housing instability and evictions in particular are associated with negative outcomes on health and on access to housing for households that are evicted. And evictions are generally preceded by substantial increases in multiple measures of household financial strain or distress.

### *1.2. Disasters and Low-Income Renters*

Disasters are not discrete environmental events, but long-term social processes in which exposure to hazards and the ability to recover are shaped through political processes of social and physical investment and disinvestment (Arcaya et al., 2020; Benner & Pastor, 2012; Lee & Van Zandt, 2019; Rumback & Makaraeicz, 2017). Locational and social vulnerability "encompasses both the probability of suffering the negative effects of hazards and disasters and the likelihood that some groups will be less able than others to navigate the recovery process successfully" (Tierney, 2019, p. 72; see also Wisner et al., 1994; Cutter et al., 2000).

Race, socioeconomic status, gender, and age all powerfully shape both physical and social vulnerability to the effects of disasters (Arcaya et al., 2020; Bolin, 2007; Peacock et al., 1997). As Lee and Van Zandt (2019) emphasize, housing tenure lies at the intersection of physical and social dimensions of vulnerability, given the correlations between tenure and unit characteristics, income, race or ethnicity, age, likelihood of insurance coverage, and housing stability. Environmental disasters reinforce pre-disaster patterns of racial and class inequality, both in their effects on housing directly and in their effects on household financial stress (Lee & Van Zandt, 2019; Rumback & Makaraeicz, 2017).

Renters are disproportionately physically vulnerable, or exposed to the potential for loss from environmental hazards. At the neighborhood level, the history of racial and economic discrimination in housing in the United States means that renters and low-income households are more likely to live in neighborhoods that have been redlined or otherwise systematically disinvested, leading to infrastructural neglect and locational or physical vulnerability (Arcaya et al., 2020; Ellen & Steil, 2019; Steil, 2018; Steil, Kelly, Vale, & Woluchem, 2021; Zhang, 2010). At the building level, renters and low-income households are more likely to live in older and often less well-maintained buildings that are more susceptible to damage from the realization of those hazards in the form of disasters (Fothergill & Peek, 2004; Lee & Van Zandt, 2019; Morrow, 1999). The dramatic effects of recent disasters on public housing units is one representation of the disproportionate exposure of low-income renters to disaster and of class- and race-based patterns in residential location and environmental vulnerability (Arcaya et al., 2020; Freemark & Steil, 2021; Hamideh & Rongerude, 2018; Hernández et al., 2018). This disproportionate exposure to environmental hazards is particularly acute for communities of color (Bolin & Kurtz, 2018; Elliott & Howell, 2017; Fothergill, Maestas, & Darlington, 1999).

Renters are also disproportionately socially vulnerable, facing limitations on "their capacity to anticipate, cope with, resist and recover from the impacts of a natural hazard" (Wisner et al., 1994, p. 9). Socioeconomic status shapes the financial and social capital on which households can draw to access and make use of disaster assistance or recovery more broadly, as well as the political capital often necessary to successfully advocate for sufficient recovery resources (Lee & Van Zandt, 2019). The intersection of economic marginalization, racial discrimination, social isolation, poor health, and legal exclusion creates cumulative vulnerability and means that both the immediate consequences of disasters and long-term obstacles to recovery are particularly acute for low-income renters of color (Arcaya et al., 2020; Fothergill & Peek, 2015).

After a disaster, housing costs may increase in the short term because of a simultaneous decrease in housing supply—caused by damage to existing housing—and increase in housing need from displaced residents, which can leave low-income renters homeless or displaced (Bolin & Stanford, 1991; Fothergill & Peek, 2004; Lee & Van Zandt, 2019; Rumback & Makaraeicz, 2017; Vigdor, 2008). Renovation and reconstruction of rental housing usually takes longer for rental housing than owner-occupied housing; this reduction of rental housing increases the demand for the remaining housing years after a disaster and contributes to the displacement of renters (Peacock, Zandt, Zhang, & Highfield, 2014). Rebuilding may also be complicated by new regulatory and insurance requirements that make construction more costly (Rumback & Makaraeicz, 2017). Renters generally have fewer resources than homeowners to meet new costs brought about by disasters, such as paying back loan-based disaster aid or obtaining needed services in the aftermath of a disaster (Bolin & Stanford, 1991; Fothergill & Peek, 2004; Lee & Van Zandt, 2019; Morrow, 1999; Peacock et al., 2014).

Through the Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 100–707 (November 23, 1988)), Congress has authorized the Federal Emergency Management Agency (FEMA) to provide financial assistance of up to $35,000 to affected households to rent alternate housing for up to 18 months if their home is uninhabitable as a result of the disaster and to repair owner-occupied private residences (42 U.S.C. §§ 5174(c)(1) (A), 5174(c)(2–3)). In the limited contexts in which households would be unable to make use of the financial assistance because of a lack of available housing units, the Stafford Act also authorizes FEMA to provide direct assistance in the form of temporary housing units, acquired by the federal government through purchase or lease (42 U.S.C.

§ 5174(c)(1)(B)(i)). This direct assistance is limited to 18 months after the disaster and commonly takes the form of manufactured housing units or travel trailers, either on a property owner's land or in shared commercial or FEMA-created group housing sites. Not every federally declared disaster qualifies individuals and households for assistance, such as the housing assistance described above, and the specific forms of assistance made available vary by declared event and FEMA region. The specific programs and their implementation have also changed somewhat over time, and the development of the National Disaster Recovery Framework since 2009 has helped clarify roles and responsibilities in the overall recovery process, including a specific focus on housing (Comerio, 2014; FEMA, 2016).[2]

The most significant federal funding for housing recovery since 1992 has come through the periodic congressional appropriation of Community Development Block Grant Disaster Recovery funds, which affected states can use in flexible ways to fund rebuilding.[3] If funds are appropriated by Congress, which is uncertain after any given disaster, each state then subsequently designs its own recovery program in compliance with U.S. Department of Housing and Urban Development (HUD) guidelines. Given the time it takes for Congress to appropriate funds, HUD to issue the statutorily required notice in the Federal Register, states to draft and submit a disaster recovery action plan, and HUD to approve the action plan and grant agreement, these allocations are unlikely to affect evictions in the near term after a disaster. In addition to these federal programs, some states have created their own disaster-related voucher, repair, and mortgage assistance programs, as well as ones designed to work in complement with any appropriated disaster recovery block grant assistance.

These existing programs provide important assistance to households whose homes are substantially damaged by a disaster in helping them find temporary housing. They especially help homeowners make short-term, initial repairs to their homes. For those renters whose homes are unaffected but who suffer negative economic effects of a disaster either because of reduced income related to a disaster's disruption of labor markets or because of increased rent attributable to a disaster-induced shortage of housing, FEMA's housing assistance is out of reach and eviction may loom. For those renters whose homes are made uninhabitable, by contrast, FEMA's housing assistance would likely help them find temporary alternative accommodations and would therefore be able to move before facing an eviction. Given the temporary nature of FEMA housing assistance and its narrow targeting toward those with substantial damage to their homes, however, FEMA assistance is unlikely to fully protect renters from a disaster's broad and lasting effects on local housing markets.

Disasters disproportionately affect low-income renters, yet existing federal and state disaster assistance programs, such as the ones described above, disproportionately benefit homeowners (Fothergill & Peek, 2004; GAO, 2009; Howell & Elliott, 2019; Lee & Van Zandt, 2019). For instance, after Hurricane Katrina a Government Accountability Office study found that federal assistance reached 62% of damaged homeowner units but only 18% of damaged rental units (GAO, 2010). The more aid that an area receives from FEMA, the wider the wealth inequality becomes between renters and homeowners and between Black and White households in the years after disasters (Howell & Elliott, 2019). Housing recovery is a markedly uneven process for different population groups; non-White and lower income groups are particularly disadvantaged, and housing in lower income areas tends to sustain more damage and recover more slowly than that in higher income areas (Howell & Elliott 2018; Lee & Van Zandt, 2019; Peacock, Zandt, Zhang, & Highfield, 2014). Exclusionary patterns in the postdisaster recovery process reinforce historical racial and economic disparities that affect low-income renter communities (Bates, 2006; Brand & Seidman, 2012; Mehta, Brennan, & Steil, 2020).

Given that existing research indicates that low-income renters live in neighborhoods and housing units that have been put at high levels of risk for disaster damage and have access to fewer of the resources needed to be able to recover from the effects of a disaster compared with homeowners, low-income renters may face a heightened risk of eviction after disasters—a crucial dimension of

environmental justice. As Comerio (2014, p. 53) notes, "policymakers assume that the private property market will adapt in post-disaster situations," yet low-income renters are likely poorly positioned to be able to take advantage of those adaptations, and indeed those adaptations by property owners and landlords may be to the detriment of low-income renters. Landlords may raise rents to meet repair and rebuilding costs, creating cost pressures on low-income renters (Fothergill & Peek, 2004). An influx of temporary residents such as rebuilding contractors, some earning per diems and salaries higher than the local cost of living and willing to pay above-market rents, can exert an upward pressure on rents. Some opportunistic landlords may take advantage of the shortage of housing supply after disasters to raise rents according to demand and may even evict current residents to gain more revenue from new ones (Fothergill & Peek, 2004). In other words, in addition to physical damage from disasters, the financial pressures on tenants and landlords could combine to heighten rates of eviction, mediated by state and local statutory rights for tenants and access to legal counsel.

Indeed, on the global scale, the United Nations Special Rapporteur on Adequate Housing, Miloon Kothari (2009, 2015), has noted in broad strokes the frequency with which large numbers of people are displaced by natural disasters. Other international research has examined the use of disasters to justify development-induced displacement or evictions, as well as the ways in which the political economy of urban development simultaneously creates uneven geographies of risk of both disaster and eviction (Ferris, 2011; Lizarralde, Fayazi, Kikano, & Thomas, 2017; Reale & Handmer, 2011; Rumbach, 2017). The extensive regulations on land use and housing construction mean that government action is essential to meet postdisaster affordable housing needs (Rumback & Makaraeicz, 2017). Yet there is a gap in empirical research in the United States in terms of quantitatively assessing the effects of disasters on evictions across multiple disasters in recent decades (Levine, Esnard, & Sapat, 2007; Peacock, Dash, & Zhang, 2007).

## 2. Research Questions and Hypotheses

Extensive research establishes the importance of housing recovery for household and community recovery (e.g., Lee & Van Zandt, 2019; Sapat & Esnard, 2017). The significance of housing stability in the postdisaster context suggests the salience of additional research that builds on the existing qualitative and quantitative scholarship on individual disasters (e.g., Binkovitz, 2018; Kaminski, 2019) to examine quantitatively, nationwide the effect of severe disasters on the frequency of eviction in the years after a disaster over decades. Here we ask, first, how a severe disaster in a county affects the incidence of completed evictions in that same county in the year of the disaster and in the years immediately following the disaster. Second, we examine how characteristics of local housing markets, such as housing costs, mediate any relationship between disasters and evictions. Third, we analyze the extent to which assistance from FEMA may mitigate any effects of disasters on evictions. To answer these questions, we develop three hypotheses about disasters and evictions.

### *2.1. Hypothesis 1: Disasters and Evictions*

As discussed, extensive research has explored the effects of disasters on housing broadly, and the disproportionate effect of disasters on low-income renters in particular (Lee & Van Zandt, 2019). Existing research has not, however, directly assessed the effects of disasters on evictions across multiple disaster sites over time. Disasters may directly lead to evictions by making housing uninhabitable and leading landlords to seek court authorization to retake possession of the property to make repairs (Rumback & Makaraeicz, 2017). Even in severe disasters, however, the number of housing units directly affected can be relatively low, meaning that any direct effect may be hard to measure. Disasters may also indirectly lead to evictions through increasing rents because of a decrease in supply (Rumback & Makaraeicz, 2017), or because of an increase in demand from displaced homeowners seeking rental housing, or an increase in demand from new temporary

residents such as contractors arriving to work on recovery and rebuilding (Vigdor, 2008). Disasters could also indirectly lead to evictions by disrupting employment patterns, for instance because of business closures or layoffs, damage to means of transportation, or interruption of childcare resources. We hypothesize that, through one or more of these mechanisms, disasters will be associated with an increase in completed evictions.

### 2.2. Hypothesis 2: The Mediating Effects of Local Housing Markets

The dynamics of housing markets differ widely by region across the United States. For instance, vacancy rates vary widely because of variation in available housing stock and demand for housing as well as the prevalence of second homes, among other reasons. We would imagine that where vacancy rates are higher, the effects of disasters on evictions will be lower as there will be more capacity to adjust to the shock of the disaster on housing supply and demand. Relatedly, where renters have higher housing costs, there is less room in their budgets to meet other needs that disasters may create (such as replacing personal property, finding new child care, covering medical expenses, or replacing spoiled food) or to cover disruption to incomes from temporary or permanent job disruptions. Renters in communities with high housing costs may therefore be more likely to fall behind on rent and face evictions (Immergluck et al., 2020). Accordingly, we hypothesize that higher vacancy rates will be associated with decreased incidence of complete evictions, whereas higher rents will be associated with increased incidence of completed evictions.

### 2.3. Hypothesis 3: The Mitigating Effects of FEMA Assistance

After severe disasters, the President often authorizes FEMA to provide financial assistance to individuals and households, including financial assistance to rent alternative housing units for renter households whose homes were rendered uninhabitable. On the one hand, higher levels of assistance could indicate greater levels of damage and thus be correlated with greater risk of eviction. On the other hand, higher levels of assistance may also indicate a temporary infusion of resources that can help some households find alternate accommodations or meet their financial needs at least in the short term. It is also plausible that an infusion of federal assistance in the year of and the year following a disaster may avoid residual housing instability in the 2–3 years after a disaster, because relying on federal assistance allows households to preserve savings and credit in the short term that can help them face financial crises in the years immediately following. We hypothesize that higher levels of assistance will be associated with lower numbers of completed evictions.

## 3. Data and Methods

### 3.1. Regression Data

To test the relationship between disasters and evictions, we combine data from the Princeton Eviction Lab regarding eviction filings and evictions with data from Arizona State University regarding county-level disaster declarations and damages, as well as census data regarding county characteristics and publicly available data from FEMA of assistance to renters by county. We build a balanced panel with 3,109 counties—those in the contiguous United States—for 2000 through 2015.

Our dependent variables are counts of completed evictions at the county level, from 2000 to 2015. We use data on evictions from the Eviction Lab, which provides completed eviction records for 38,795 county-years between 2000 and 2015.[4] It is likely that this database actually undercounts the true number of renters that have been forcibly displaced by evictions because it primarily draws from court records, which only capture formal evictions. Before taking formal steps landlords can force

renters out of units through intimidation, illegal lockouts, or constructive evictions that render properties uninhabitable. Joining the Eviction Lab data with our balanced panel indicates that data on evictions are missing for 22% of county-years. To ensure that this missingness in the eviction data does not bias our analyses, Figure A1 in Appendix A shows that missingness, although substantial, does not vary systematically with a state's disaster exposure.

Data from the Eviction Lab provide the most complete picture of evictions nationally; however, there is substantial state-level variation in the accuracy and in the reporting of formal evictions that raises challenges for national analyses (Nelson, Garboden, McCabe, & Rosen, 2021; Porton, Gromis, & Desmond, 2020). As Nelson, Garboden, McCabe, and Rosen (2021) have identified, there is significant variation in state and local landlord–tenant laws, including tenant protection policies and the opportunities for tenants' to raise affirmative defenses; in how and when landlords file for eviction, shaped in part by state and local differences in the costs of eviction filings; in how state court systems facilitate informal resolutions of evictions, such as mediation or settlement agreements; in the timing of eviction proceedings; and in how the location and organization of city court structures affect filings and outcomes. Further, states have differing policies regarding the release of eviction data, such as California, which allows tenants to limit public access to prior eviction court records, or Wisconsin, which seals cases ending in a dismissal after 2 years. We address these issues, in part, by creating a panel data set over 16 years and incorporating county fixed effects, to focus on any changes within a county after a disaster. As a robustness check to account for any state-specific reporting practices that may skew eviction counts, we add a state fixed effect in an additional specification to further isolate changes in eviction within a county after a disaster.

The primary independent variable of interest is severe disasters, which we define as the top 5% by property damage of the 24,383 county-events that received Presidential Disaster Declarations between 1992 and 2015. Summarized to county-years, between 2000 and 2015 there are 9,156 county-years with disasters, of which 514 are severe. We use data on events from Arizona State University's Spatial Hazard Events and Losses Database for the United States (SHELDUS) database.[5] SHELDUS primarily relies on National Weather Service reporting to estimate damages.

Our analysis uses social and economic covariates, such as share rental and multifamily housing and share living in poverty, available through the U.S. Census and the American Community Survey.[6] These census data are standardized from 2000 to 2010 county geographies by the Brown Diversity and Disparities Project.[7] We use the American Community Survey for these covariates for 2015, and use measures of rent burden from the Eviction Lab.

Finally, our analysis accounts for the effect of FEMA assistance on evictions. We use the total numbers of renters' registrations and inspections, and values of rental assistance delivered to renters by county, for 2004 to 2015.[8] The FEMA data are unavailable before 2004. There are 2,422 county-years in which FEMA assistance to rent temporary housing was delivered to renters between 2004 and 2015.

The full panel of the 3,109 counties and 16 years totals 49,744 observations. For the primary regression analysis, we work with a panel of 29,802 county-years, after accounting for missing eviction records, undefined lags at the start of the panel in 2000 through 2003, and four counties for which a covariate does not match the 2010-standardized county geographies from Brown. For the regression analysis of the effect of federal aid, we work with a panel of 9,995 county-years after further accounting for the years for which FEMA aid was not reported and for which lags are undefined from 2004 through 2007, and limiting the set of counties in the panel to those in which any FEMA disaster rental aid was ever delivered to renters.

### 3.2. Statistical Approach

We identify the effect of disasters on completed evictions using these panel data. Although the location of disasters is not random, the timing of disasters is exogenous to state- or county-level characteristics. This exogenous variation in timing enables us to create causal estimations of the effects of disasters on the count of evictions.

We carry out a linear panel regression to estimate the effect of disasters on evictions. We specify a distributive lag model, to test whether a disaster in a given year has an effect on evictions in subsequent years. A distributive lag model interpretably captures two common scenarios in the data. First, when one county experiences severe disaster(s) in a year, the flag for that county-year indicates there is (at least) one disaster in that year. Second, when one county has multiple recent years in which there was a severe disaster, the lags of flags from preceding years indicate a previous disaster.

We isolate the effects of disasters on evictions by including demographic and housing market measures as pretreatment confounders and specifying county-level fixed effects, to control for time-invariant unobserved differences between counties, such as differences in landlord–tenant law or local eviction reporting. Our range of pretreatment confounders varies with time to avoid an estimate biased by omitting variables.[9] We use year fixed effects to control for unobservable differences between years. To account for serial correlation within each county across years, we cluster robust standard errors at the county level.

The model is described in Equation (1):

$$Y_{it} = \beta_0 D_{i,t} + \beta_1 D_{i,t-1} + \ldots + \beta_4 D_{i,t-4} + \gamma^T \mathbf{C}_{it} + c_i + y_t, + e_{it} \quad (1)$$

$Y_{it}$ is the number of evictions in county *i* and time *t*. $D_{i,t}$, $D_{i,t-1}$, etc. are the severe disasters in county *i* at time *t, t − 1*, etc., and $\mathbf{C}_{it}$ are a collection of time-varying demographic and housing market characteristics. The individual- and time-specific intercepts (i.e., county and year fixed effects) are $c_i$ and $y_t$, respectively. The error term is $e_{it}$.

### 3.3. Case Study

This quantitative analysis only tells us about the net effect of disasters on evictions, so we use the case study to help reveal the specific mechanisms at work. We also conducted a qualitative case study of the experiences of renters in Bay County and Panama City (the largest city in Bay County), Florida, which were heavily damaged by Hurricane Michael in October 2018. During March and October 2019, we conducted 25 in-person, semistructured interviews with social service providers, legal advocates, property managers, local government officials, and renters who were living in Bay County when Hurricane Michael hit, as well as telephone interviews with service providers before and after our site visits. These interviews lasted for 40 min on average, although discussions with social service providers, legal advocates, and renters tended to run longer, whereas property manager interviews ran shorter.

We employed a snowball sample strategy to recruit interview subjects. Doorways North Florida, a social service organization connecting individuals to housing resources, and Legal Services North Florida (LSNF), a legal aid provider, both advised on the recruitment plan. We also recruited interview subjects at the Panama City Community Recovery Center in the Panama City Library, which was the survivor-facing hub for federal, state, and local recovery resources, and conducted unstructured observations of program administration there in October 2019. We interviewed four social service providers, five legal aid and volunteer attorneys, three property managers, two public officials, and 11 residents, for a total of 25 interviews. To analyze these data, we grouped interview transcripts by type of respondent before reviewing them for general themes. We used those initial themes to create codes related to experiences with landlords, government agencies administering disaster aid, and legal service providers and legal proceedings.

To plan our site visit and construct interview guides, we reviewed county court data regarding eviction filings, online articles, and archival newspaper clippings (prepared and maintained by the archival staff at the Bay County Public Library) from the lead-up to and aftermath of Hurricane Michael. We primarily used these documents to identify frequent evictors and their properties to inform our interview outreach to property managers and affected renters. We used 11,172 records from the Bay County Circuit Civil Court from 2012 to 2018 to investigate evictions leading up to and through Hurricane Michael.[10] Each record is a unique observation of a landlord filing an eviction claim against a renter. We use an optimal string alignment fuzzy match to clean the field representing landlord name, to account for discrepancies among names such as inconsistently placed periods or spaces, or landlord middle names or corporation types. In matching, we allow for up to two character-differences between plaintiff names.

### 3.4. Research Design

This study utilizes a mixed-methods research design to better understand how disasters affect evictions. The quantitative approach is useful in establishing a causal relationship between disasters and evictions. Both disasters and evictions are social phenomena (Arcaya et al., 2020; Benner & Pastor, 2012; Lee & Van Zandt, 2019; Rumback & Makaraeicz, 2017), shaped by social mechanisms and processes, and qualitative research can help uncover in richer detail the nature of those mechanisms and processes. The case study helps us to understand in greater detail how and why disasters and evictions interact to affect the lives of renters. By adding qualitative insights to our quantitative findings and grounding them in the lived experiences of renters living in a disaster-affected place, we are able to illuminate how different types of landlords may respond differently to disasters, identify some of the types of arguments landlords bring in postdisaster eviction cases, and better understand what disasters and disaster-related evictions mean for renters over the months following a disaster.

## 4. Results

### 4.1. Quantitative Results

We begin by presenting descriptive statistics at the county level, organized into quintiles by the cumulative disaster damage from 2000 through 2015. We also present a column for Bay County, Florida. As Table 1 indicates, the county mean values for most characteristics, such as percentage in poverty, percentage with a bachelor's (BA) degree or higher, homeownership rates, home values, or rent burdens, are either relatively similar or display no consistent pattern across levels of disaster damage. As levels of disaster damage increase, county population increases consistently, which is not surprising because the value of disaster damage will have some relation to the number of households affected. Counties in the top three quintiles by disaster damage also have substantially higher population densities and modestly lower vacancy rates than those counties in the bottom two quintiles. As expected, as levels of disaster damage increase, applications for FEMA assistance and actual assistance received increase as well. The number and rate of eviction filings and evictions is highest in the highest quintile of counties by disaster damage, and generally increases consistently with disaster damage. In Appendix B Table B1 we present a similar table but with the counties sorted by evictions.

Table 2 presents data on completed evictions relative to years before, of, and after severe disasters for those counties in the top decile of disaster damage between 2010 and 2015. In this subset, there are 398 county-years in which there is a disaster, representing 297 unique counties. At a descriptive level, the data in Table 2 suggest that the incidence of eviction increases by 43 renters from the year before to the year after a disaster (from 1,372 in the year before the disaster to 1,415 in the year after the disaster).

**Table 1.** Quintiles of counties by cumulative disaster property damage, 2000–2015.

| | 0–20% | 20–40% | 40–60% | 60–80% | 80–100% | Bay County |
|---|---|---|---|---|---|---|
| Counties | 622 | 622 | 621 | 622 | 622 | - |
| Evictions (mean 2000–2015) | | | | | | |
| Eviction filing rate | 1.25 | 1.22 | 1.53 | 1.93 | 2.25 | 2.435 |
| Eviction filings | 22.5 | 22.62 | 30.07 | 74.45 | 124.94 | 646.5 |
| Eviction rate | 0.94 | 0.96 | 1.21 | 1.39 | 1.63 | 5.913 |
| Evictions | 15.67 | 18.75 | 25.12 | 53.94 | 102.15 | 1,557.63 |
| Covariates (2015) | | | | | | |
| Population | 17,855.5 | 18,142 | 22,328 | 35,526.5 | 51,699 | 180,117 |
| Population density | 27.8 | 34.32 | 40.36 | 55.01 | 77.51 | 237.48 |
| % Households in poverty | 15.9 | 14.85 | 14.5 | 15.05 | 15.9 | 15.4 |
| % non-Hispanic White | 78.5 | 87.4 | 89 | 85.95 | 76.95 | 77.3 |
| % BA or higher | 12.8 | 12.2 | 12.7 | 13.2 | 13.55 | 14.4 |
| % Multifamily housing units | 4.1 | 4.3 | 4.8 | 5.7 | 7.2 | 24.4 |
| % Vacant housing units | 18.5 | 16.4 | 15.3 | 14.85 | 14.8 | 32.3 |
| % Owner-occupied units | 71.95 | 73.4 | 73.2 | 73.1 | 71.4 | 62.4 |
| Median rent | 677 | 660 | 665 | 681.5 | 735 | 966 |
| Median home value | 121,900 | 111,800 | 113,200 | 117,700 | 128,200 | 166,400 |
| % Rent-burdened households | 28.6 | 27.9 | 28.1 | 29.1 | 29.8 | 31.4 |
| Renter households | 2,009.5 | 1,929 | 2,427 | 3,820 | 6,107 | 28,590 |
| Exposure (sum 2000–2015) | | | | | | |
| Property damage ($1000s) | 0 | 538 | 2,686 | 9,582 | 69,518 | 70,355 |
| Extreme (2%) damage events | 0 | 0 | 0 | 0 | 0 | 0 |
| Extreme (5%) damage events | 0 | 0 | 0 | 0 | 1 | 1 |
| Extreme (10%) damage events | 0 | 0 | 0 | 0 | 1 | 2 |
| Extreme (25%) damage events | 0 | 0 | 0 | 1 | 2 | 4 |
| Any damage events | 0 | 2 | 3 | 4 | 5 | 6 |
| FEMA assistance (sum 2004–2015) | | | | | | |
| Valid renter households | 0 | 0 | 3 | 10 | 168 | 798 |
| Inspected renter households | 0 | 0 | 2 | 8 | 135 | 574 |
| Approved renter households | 0 | 0 | 1 | 4 | 74 | 322 |
| Rental amount to renter households ($1000s) | 0 | 0 | 0.39 | 2.28 | 76.61 | 171.56 |
| Other needs assistance amount to renter households ($1000s) | 0 | 0 | 0 | 4.57 | 112.83 | 497.43 |

**Table 2.** Evictions relative to years with severe disasters, 2000 to 2015.

| | Year before | Year of | Year after | County-years | Unique counties |
|---|---|---|---|---|---|
| Evictions | 1,372 | 1,394 | 1,415 | 398 | 297 |

*Note*: Counts and rates for disaster-prone counties (i.e., those experiencing the top decile of damage from 2000 to 2015).

The first two regressions are presented in Table 3. The first regression looks at the lagged effect of disasters on evictions, and the second adds county-level housing market and socioeconomic covariates. Model 1.1 indicates that a severe disaster is associated with a statistically significant increase in evictions in the year of a disaster and the year following a disaster and is weakly associated with an increase in evictions 2 years after a disaster. After introducing county characteristics in Model 1.2, severe disasters continue to be associated with an increase in evictions in the year of a disaster and the year following a disaster (although the significance in the year following the disaster declines modestly), and weakly associated with an increase in evictions 2 years after the disaster. A higher vacancy rate and a higher median rent are both associated with an increase in evictions, whereas median home value has a small negative association.

Table 4 presents the final regression, estimating the relationship between FEMA disaster assistance and evictions. In Model 1.3, interacting the value of FEMA rental assistance delivered to renters with the occurrence of a severe disaster, we find that the amount of FEMA aid per renter household is associated with fewer evictions 2 years after the disaster. Examining the marginal effect of disaster on

**Table 3.** Disasters and evictions.

| | Model 1.1 | | Model 1.2 | |
|---|---|---|---|---|
| | Evictions | | Evictions | |
| Dependent | Estimate | *SE* | Estimate | *SE* |
| Severe disaster | 98.82 * | 41.17 | 95.46 * | 44.01 |
| Severe disaster (t − 1) | 115.08 ** | 40.42 | 111.92 * | 43.93 |
| Severe disaster (t − 2) | 97.75 . | 51.43 | 95.87 . | 52.04 |
| Severe disaster (t − 3) | 55.05 | 58.46 | 53.04 | 58.52 |
| Severe disaster (t − 4) | 39.54 | 46.35 | 39.57 | 46.32 |
| Pop. density | | | − 1.12 | 0.84 |
| % Households in poverty | | | 2.12 . | 1.23 |
| % Pop. non-Hispanic White | | | − 11.11 . | 5.69 |
| % Pop. older than 25 with BA or higher | | | 7.36 | 4.61 |
| % Multifamily housing units | | | 5.05 | 6.33 |
| % Vacant housing units | | | 4.54 * | 2.23 |
| % Owner-occupied units | | | − 0.12 | 1.50 |
| Median rent ($100s) | | | 35.76 *** | 9.86 |
| Median home value ($1000s) | | | − 1.21 * | 0.58 |
| % Rent-burdened households | | | − 0.12 | 0.45 |
| Fixed effect | Year, county | | Year, county | |
| $R^2$ | 0.00296 | | 0.02445 | |
| F statistic | 184.63 | | 188.01 | |
| *DF* | 29,812 | | 29,802 | |

*p* values: .001, ***; .01, **; .05, *; .1.

evictions, presented in Appendix C, Figure C1 we see that the effect of disasters decreases with increasing amounts of rental assistance delivered to renters. Moderate to high amounts of assistance produce a significant negative marginal effect of disaster on evictions.

Together, the results paint a consistent picture. First, severe disasters lead to an increase in evictions in the year of a disaster and the year following a disaster. We explore the potential mechanisms behind this increase in the qualitative interviews and case study below. Regardless of the specific mechanism, tenants face a significantly higher incidence of eviction in the year of a severe disaster and the following year.

Second, as median rents increase, the incidence of evictions after disasters increases, potentially because tenants have limited capacity to respond to the disaster-related financial shocks in counties with already high rents. Somewhat surprisingly, higher vacancy rates are associated with higher rates of evictions, perhaps because the vacancy rate is correlated with other local economic characteristics.

Third, the value of FEMA assistance to renters seems to be associated with a lower frequency of eviction 2 years after the disaster. One explanation for this result may be that FEMA aid in the 18 or more months following the disaster helps renters avoid taking on high levels of debt in the immediate response to the disaster and provides residents with some financial buffer to ensure housing stability in the second year after a disaster, as labor and housing markets continue to recover.

#### *4.1.1. Robustness Checks and Additional Insights*

To evaluate the robustness of these models and explore related questions we estimate several additional models, presented in Appendix D. We evaluate the stability of results using alternative measures of the core variables, subsets of the panel, and alternative constructions of the model presented above.

First, we examine eviction filings as opposed to completed evictions. There is reason to believe filings may mirror evictions and increase after disasters, but there is also the possibility that filings may not mirror evictions, if the formal or informal processes between filing and eviction favor landlords more after a disaster. Run for eviction filings, Table D1 reports the initial and baseline specification. We do not find a significant association between disasters and eviction filings. Viewing

**Table 4.** Disasters, evictions, and federal assistance.

| | Model 1.3 | |
|---|---|---|
| | Evictions | |
| Dependent | Estimate | *SE* |
| Severe disaster | 61.05 | 68.28 |
| Severe disaster (t − 1) | 97.19 | 72.70 |
| Severe disaster (t − 2) | 58.51 | 64.09 |
| Severe disaster (t − 3) | − 15.57 | 59.73 |
| Severe disaster (t − 4) | − 41.09 | 49.44 |
| Pop. density | − 1.34* | 0.67 |
| % Households in poverty | − 0.75 | 1.97 |
| % Pop. non-Hispanic White | − 9.52 | 10.83 |
| % Pop. older than 25 with BA or higher | 14.11 | 7.26 |
| % Multifamily housing units | 0.78 | 11.10 |
| % Vacant housing units | 0.42 | 2.33 |
| % Owner-occupied units | 0.08 | 2.32 |
| Median rent ($100s) | 37.16* | 14.83 |
| Median home value ($1000s) | − 4.99* | 2.31 |
| % Rent-burdened households | − 1.70 | 1.17 |
| Rental households | − 0.02 | 0.01 |
| Ratio of rental assistance ($1000s) to renter households | − 96.61 | 280.56 |
| Ratio of rental assistance ($1000s) to renter households (t − 1) | − 376.64 | 352.16 |
| Ratio of rental assistance ($1000s) to renter households (t − 2) | 30.05 | 88.16 |
| Ratio of rental assistance ($1000s) to renter households (t − 3) | − 7.36 | 39.94 |
| Ratio of rental assistance ($1000s) to renter households (t − 3) | 41.47 | 42.34 |
| Severe disaster × Ratio of rental assistance ($100s) to renter households | − 179.54 | 338.40 |
| Severe disaster (t − 1) × Ratio of rental assistance ($1000s) to renter households (t − 1) | − 41.61 | 409.01 |
| Severe disaster (t − 2) × Ratio of rental assistance ($1000s) to renter households (t − 2) | − 413.42* | 203.69 |
| Severe disaster (t − 3) × Ratio of rental assistance ($1000s) to renter households (t − 3) | − 57.87 | 67.48 |
| Severe disaster (t − 3) × Ratio of rental assistance ($1000s) to renter households (t − 4) | − 48.13 | 59.77 |
| Fixed effect | Year, county | |
| $R^2$ | 0.07141 | |
| F statistic | 175.96 | |
| *DF* | 9,695 | |

*Note*: For counties that ever received federal disaster renter aid.
*p* values: .001, ***; .01, **; .05, *; 0.1.

this result alongside the increase in evictions, one possible interpretation is that evictions increase while filings stay constant because tenants are more likely to abandon units or less likely to fight eviction proceedings after disasters, leading to higher rates of default judgments in favor of landlords. Another possible interpretation is that landlords may use damage to units as a reason to justify evictions, which housing or civil court judges find convincing.

Second, we focus on evaluating alternative constructions of the dependent variable. As an alternative to county-level counts of evictions, we use county-level eviction rates, using the number of renter households as the denominator, and we separately run the model without adjusting for the number of renter households. These results are presented in Table D2 and are consistent with the models presented above.

Third, we validate our specification by looking at different subsets of the sample. We study a subset of the counties that have fewer than 2 million people, as housing instability may differ by county size. We also study a subset of counties that are disaster prone, as measured by those with 2 years of disasters in the top quartile for damage in the panel. Neither produces results substantively different from the main results presented above. This result is presented in Table D3.

Fourth, we validate our specification with three robustness checks. First, to assess whether the lagged results may be the product of spurious correlations, we use placebo leads for up to 4 years prior to the disaster. The test generates no significance on the placebo leads. Second, to further explore spurious correlations, we use two additional lags for years 5 and 6 after a disaster. The test

generates no significance on the additional lags. Finally, we specify a time trend at the state level to account for any time-variant but unobserved confounders. The results of this model are substantially similar to the results presented here. These results are presented in Table D4.

Fifth, we focus on the central independent variables of interest to detect any hazard-specific effects. We assess whether specific types of disasters (e.g., flooding disasters as compared with fires) have differential effects on evictions. Floods commonly substantially damage structures without destroying them whereas fires commonly destroy entire homes. The independent variable here indicates when the extreme disaster is a flood (or fire) and we limit the data set to counties that have ever experienced a severe one. There are 5,488 county-years on which to estimate the model for floods and we detect a positive effect on evictions in the year of a flood. This result is reported in Table D5. There are only 320 records for fire, which is too few to fit the model.

Sixth, to confirm that state differences in the public reporting of evictions do not bias the results, we present a regression in Table D6 with a state fixed effect to adjust for the fact that states can have different reporting processes. These results are substantially similar.

### 4.2. Case Study Results

Hurricane Michael made landfall in Bay County, Florida, on October 10, 2018, as the third most intense hurricane (as measured by barometric pressure) ever to strike the contiguous United States. A Category 5 hurricane with peak wind speeds near 160 miles per hour, Hurricane Michael destroyed roughly 1,500 structures in Bay County and damaged more than 45,000. Appendix E Figure E1 and Figure E2 give historic disaster exposure and eviction rates in Florida. The hurricane devastated Panama City's rental housing stock. Of 8,396 multifamily units existing before the storm, 4,623 were damaged, leading to the displacement of thousands of households ("Bay County working hard to establish housing post-Michael," 2019). The Panama City Housing Authority likewise reported losing half their units to the storm, with hopes of recovering their stock in 2–5 years at the earliest (Panama City Housing Authority Official, personal interview, October 23, 2019). In what was an already tight housing market, Hurricane Michael decimated housing availability for low-income people almost overnight.

After the hurricane, federal assistance reached renters through FEMA's temporary rental assistance program, which provides relief for up to 18 months, and HUD's mobile vouchers program, for those who were already public housing tenants (more on this below). At the state level, Florida's housing relief efforts were largely focused on transforming renters into new homeowners, and supporting existing homeowners. As Bay County's Community Development Block Grant director explained, housing policymakers in the state saw the storm, and the resulting flow of funding, as an opportunity to shift renters into homeownership. Accordingly, city and county officials prioritized programs to provide low-interest mortgages, down payment assistance, foreclosure counseling to homeowners (qualifying applicants did not need to be first-time homebuyers), bridge loans, and expanded HOME funds to developers of affordable homeownership housing (Bostick, 2020; Florida Housing Finance Corporation, 2020).[11]

The majority of funds for new construction were earmarked for single-family homes, resulting in 6,048 new single-family units and just 2,061 multifamily units planned (Bostick, 2020). Whereas taking the influx of funding that came with the storm to prioritize creating new homeowners has possible advantages, such as increasing household wealth, doing so at the expense of rental relief was a concern for many of the service providers we interviewed. They cited a lack of resources for Bay County's unhoused population and for those who were far—in terms of savings, social service support, and lucky breaks—from being able to purchase their own homes (Social Service Provider 2, personal interview, October 15, 2019, Panama City, FL).

The respondents we interviewed in Panama City vividly conveyed the experience of acute housing shock in the storm's wake. Social service providers, advocates, and government officials described a rise in "small evictors," detailing how some of these landlords with few units were reluctant to evict tenants but felt they ultimately needed to file eviction notices because the units

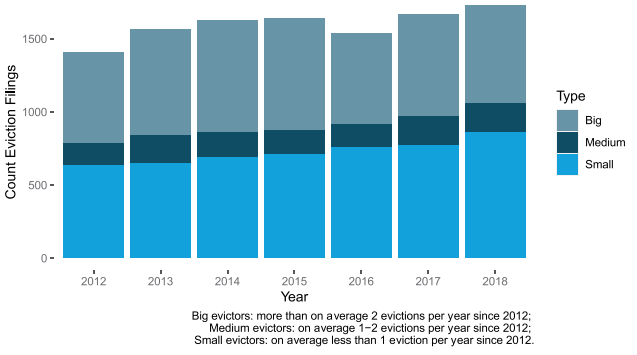


**Figure 1.** Eviction filings in Bay County, Florida, 2012–2018.

were unsafe. As shown in Figure 1, significantly more evictions were filed in Bay County in 2018 than in previous years ($p = .036$, Wilcoxon signed rank test). The increase in evictions can be attributed to a spike in evictions from small evictors, landlords who evicted on average less than one person per year since 2012. These evictions significantly increased to 859 in 2018, compared with a median of 711 evictions per year ($p = .036$, Wilcoxon signed rank test). Respondents contrasted these smaller landlords with larger landowners, many of which were corporate entities with out-of-state owners, some of whom served blanket eviction notices regardless of the condition of their units.

Legal advocates expressed particular concern about the use of the habitability clause of Florida's landlord–tenant laws to justify poststorm evictions, despite this statute only applying to tenant-initiated lease terminations (Legal Service Provider 1, personal interview, July 8, 2019; Legal Service Provider 3, personal interview, July 9, 2019; Legal Service Provider 4, personal interview, July 9, 2019; Legal Service Provider 5, personal interview, July 10, 2019). Although Section 83.63 of the Florida Statutes allows only the tenant to terminate the lease agreement "If the premises are damaged or destroyed. . .," landlords continually cited the habitability clause as cause for evictions (Fla. Stat.§ 83.63 (2011)). Advocates were able to address this argument only in a fraction of cases because of limited resources and staff capacity and the far-reaching public education and policy advocacy efforts that would be required to limit the improper use of the clause (Legal Service Provider 5, personal interview, July 10, 2019).

At the same time, respondents suggested that some landlords were slow to repair legitimately damaged units, citing a lack of aid from FEMA and the difficulty of finding available contractors, among other reasons. Legal advocates struggled with how to force landlords to make timely repairs (Legal Service Provider 3, personal interview, July 9, 2019; Legal Service Provider 4, personal interview, July 9, 2019; Legal Service Provider 5, personal interview, July 10, 2019). The slow pace of repairs to damaged units left tenants facing the difficult decision of whether to stay in damaged units (often risking exposure to mold, among other hazards) or vacate their units and risk not being able to find another affordable unit in the area (Social Service Provider 1, personal interview, June 21, 2019; Social Service Provider 2, personal interview, October 15, 2019, Panama City, FL).

One of the reasons small landlords had trouble accessing assistance from FEMA or loans from the Small Business Administration was the lack of documentation of clear title to the land (Legal Service Provider 3, personal interview, July 9, 2019; Legal Service Provider 5, personal interview, July 10, 2019). Without documented proof of title, federal agencies generally cannot disburse recovery aid, landlords cannot afford to repair their damaged units, and tenants consequently have even fewer options (Garcia, 2021). Tangled deeds and heirs' property arise from an informal transfer of real property, often between family members, without a formal recording. These informal, unrecorded transfers can lead to forced sales of land and have undermined Black landownership, especially in rural areas across the South (Mitchell, 2000; Mitchell, Malpezzi, & Green, 2009). Legal advocates had noted issues with

tangled deeds and tried to raise awareness about the risks of lacking legal title even before Hurricane Michael struck, and had obtained a grant to update title documents for their clients, but had to prioritize eviction defense in the immediate aftermath of the storm (Legal Service Provider 4, personal interview, July 9, 2019; Legal Service Provider 5, personal interview, July 10, 2019).

Renters also reported being affected by informal lease practices in the county. Residents and volunteer attorneys detailed how there was little that could be done for tenants without formal leases (Legal Service Provider 2, personal interview, July 8, 2019; Legal Service Provider 4, personal interview, July 9, 2019; Legal Service Provider 3, personal interview, October 16, 2019). Informal renters often could not even make claims for minimal FEMA aid to cover replacing lost belongings because they did not have the required documentation to demonstrate their residence in a damaged housing unit. Respondents in these informal situations described being forced to sleep in tents or take shelter in their cars (Social Service Provider 1, personal interview, June 21, 2019; Bay County Resident 2, personal interview, October 15, 2019, Panama City, FL; Bay County Resident 5, personal interview, October 16, 2019, Panama City, FL).

Subsidized renters also found themselves in a difficult situation, after the Panama City Public Housing Authority lost roughly half of its housing units to disaster damage. On the one hand, some tenants receiving Housing Choice Vouchers, who were able to evacuate before the storm, encountered challenges in returning because they were sometimes seen as having forfeited their vouchers by abandoning the unit (Social Service Provider 3, personal interview, July 9, 2019; Bay County Resident 7, personal interview, October 16, 2019, Panama City, FL). On the other hand, those voucher holders who stayed and whose units were damaged had difficulty finding new rentals within the fair market rent limit, as the posthurricane rent for newly rented units increased dramatically (Social Service Provider 3, personal interview, July 9, 2019). Nearby housing authorities stepped up to place Panama City subsidized renters in their few openings, and HUD eventually provided the Panama City Housing Authority with portable vouchers that tenants could use to seek housing anywhere in the country (Panama City Housing Authority Official, personal interview, October 23, 2019). With these portable vouchers, Panama City's subsidized tenants scattered across Florida and the South, and respondents suggested that it was unlikely that many would return given the 2- to 5-year timeline for reconstructing the lost units (Panama City Housing Authority Official, personal interview, October 23, 2019).

The property managers we interviewed echoed the story of extensive damage and extended unit recovery timelines. Property managers of income-restricted housing identified background checks as a significant barrier to lease-up for tenants. Despite long wait lists for many units, one property manager suggested that some habitable units (particularly three- and four-bedroom units) remained vacant a year after the disaster because interested tenants who were evicted in the immediate aftermath of the storm could not pass the background check as their leasing policies banned applicants with eviction histories (Property Manager 1, personal interview, October 15, 2019, Panama City, FL). Although property managers noted that many of these poststorm evictions were illegal and that affected tenants largely did not have the resources to fight them, legitimate and illegitimate evictions "all show up the same way" in the background check (Ibid). Managers nevertheless retained substantial discretion, creating room for bias in tenant selection processes, especially as evictions (and consequent eviction records) are disproportionately experienced by low-income people of color (Property Manager 3, personal interview, October 16, 2019, Panama City, FL; Greenberg, Gershenson, & Desmond, 2016; Robinson & Steil, 2021; Thomas, Toomet, Kennedy, & Ramiller, 2019).

Every Bay County resident with whom we spoke confirmed that the housing landscape after Hurricane Michael has been challenging to navigate and expensive, and almost all believed they were in a qualitatively worse housing situation after the storm. Some had been forced to move into temporary coliving situations with family members (for our interviewees, these coliving situations were less suitable because they were typically outside a commutable distance to work or school) or to bounce between homeless shelters, despite residing in stable housing before the storm; others found their cars and tents to be more reliable options than shelters, given the competition for shelter

beds even a year after the storm (Bay County Resident 4, personal interview, October 16, 2019, Panama City, FL; Bay County Resident 11, personal interview, October 17, 2019, Panama City, FL). Respondents suggested that the storm reinforced inequalities in housing along racial lines, as many people of color lacked the resources to evacuate before the storm or relocate outside of North Florida after the storm and were stuck in Panama City in cycles of housing instability.

Almost all residents had problems with mold in their units immediately following the storm, and many reported that mold and mildew issues were lower priorities for landlords to address than pressing structural repairs (Bay County Resident 3, personal interview, October 15, 2019, Panama City, FL; Bay County Resident 5, personal interview, October 16, 2019, Panama City, FL; Bay County Resident 9, personal interview, October 17, 2019, Panama City, FL; Bay County Resident 10, personal interview, October 17, 2019, Panama City, FL). One mother shared that her two asthmatic children had significant flareups in the unit she rented after the storm because of mold. She moved them to a shelter, as a last resort, because finding a unit she could afford that was safe for her children proved too challenging (Bay County Resident 6, personal interview, October 16, 2019, Panama City, FL). Thus, a final commonality among residents were the significant health concerns they faced as a result of their unstable housing, and how health and housing concerns compounded on one another to create serious challenges for disaster recovery.

## 5. Discussion

The quantitative and qualitative results together illuminate the profound challenges that low-income renters face after severe disasters. For low-income renters, the structural barriers they already face in getting and keeping stable housing and avoiding evictions are exacerbated after disasters. Renters must navigate an already insufficient stock of safe, stable, and affordable homes; federal recovery programs that require time, resources, and digital literacy to manage; and underfunded social and legal service interventions that inadequately fill the gaps left by a rigid and limited housing safety net. In short, we observe from our Bay County case study how the challenges renters face after a disaster extend well beyond the adversarial landlord–tenant relationship that is often the focus of studies on evictions.

In Bay County, these structural barriers combined to create the perfect storm of inaccessible housing. Dramatic damage to the local housing stock led to widespread displacement. Small landlords with few resources struggled to obtain financing to make repairs, leaving their renters with uninhabitable units or facing eviction. Larger landlords with more resources sometimes took advantage of the disaster to evict renters, make repairs, and increase rents, consistent with prior analyses (Fothergill & Peek, 2004). Displaced renters had trouble finding affordable units and those renters who had been evicted faced additional difficulties in finding new housing because of their eviction record. The disruption had lasted for a year at the time of interviews and seemed likely to continue well into the future, as formerly housed families remained homeless.

These qualitative experiences are reflected in the nationwide quantitative findings. Severe disasters are associated with a significant increase in completed evictions the year of and the year after a severe disaster. Although the direct impact of the disaster may be brief, the consequences are enduring and the challenges renters face in accessing housing and maintaining housing stability continue for years. These effects of disasters on evictions are moderated where median rents are lower. FEMA assistance to renters is associated with declines in evictions 2 years after a disaster; the Stafford Act authorizes FEMA to disburse individual assistance up to 18 months after a disaster, and the effect of FEMA assistance seems to be strongest by the second year after the disaster.

The findings raise important questions for future research on a more granular level that analyzes in greater detail the legal, social, and economic processes that lead to evictions after disasters. To what extent do evictions rise directly because of damage to housing, or indirectly because damaged

housing and increased demand together lead to changes in rents, or indirectly because of economic dislocation for tenants? How are the eviction dynamics in the aftermath of disasters similar to and different from the drivers of eviction at other times? Future research could also explore whether disasters are associated with changes in the rate of evictions for nonpayment of rent compared with no-fault evictions, and shed light on landlord motivations, focusing on patterns in evictions along class, race, and gender lines that may be accentuated during disasters. Other research could also examine whether changes in evictions after disasters differ by private, for-profit landlords compared with providers of publicly subsidized housing units.

Given existing research on the negative consequences of evictions, the finding here that disasters are associated with increases in evictions suggests that policymakers should consider interventions that might interrupt this relationship between disasters and housing instability. Potential state and local policy interventions include eviction moratoria, changes to court procedures during disasters, a right to counsel for tenants, or expungement of eviction records.

In response to the COVID-19 pandemic, the federal government and many state and local jurisdictions enacted eviction moratoria that protected tenants from being evicted for some period of time, even though the number and kinds of tenants who qualified for protections and the duration of moratoria varied widely. Jurisdictions in Florida had experimented with such protections before the pandemic, specifically to respond to environmental disasters. For instance, Miami-Dade County enacted an ordinance to protect residents of public and county-owned housing from being evicted during disasters (Brey, 2020). As the broad eviction moratoria in response to the pandemic suggest, however, protections can extend beyond residents of public housing, and jurisdictions that are particularly susceptible to disasters have the opportunity to lead the country in these efforts.

Along with provisions for eviction moratoria after environmental disasters, emergency tenant protections could include the suspension or extension of deadlines for tenants to respond to eviction notices. It is possible that part of the explanation for the increase in eviction rates after disasters is an increase in default judgments. Default judgments are often entered against tenants who have evacuated or been temporarily displaced by disasters. Not only do these default judgments make any return to the unit by a tenant who evacuated difficult or impossible, these judgments then follow tenants and prevent them from procuring housing elsewhere.

Efforts are currently underway in cities such as New York to provide a right to counsel for tenants facing evictions (Robinson & Steil, 2021). Nationally, only 10% of tenants are represented by counsel, compared with 90% of landlords (Schultheis & Rooney, 2019). This disparity allows landlords to better navigate complicated court proceedings with the guidance of costly legal counsel, whereas tenants often see no choice but to settle the case or leave the housing unit. Guaranteeing a right to counsel in other cities, at least for tenants facing eviction after disasters, would give vulnerable tenants a fighting chance to remain in stable housing (Pollock, 2012). FEMA's Disaster Legal Services program, which provides free legal help to low-income disaster survivors, coordinates volunteer lawyers to provide counsel to tenants having troubles with landlords ("Disaster Legal Services," 2020). Our discussions with both tenants and lawyers in Bay County, however, indicated that the program did not reach some of the most precarious renters.

Where stronger eviction moratoria, filing deadline suspensions, or a right to counsel are not possible, disaster-related evictions could be expunged from tenants' records. Some states are already experimenting with such policies, but so far they only seal eviction records—meaning the content of the case is not made public—instead of completely removing the case from the public record. Automatic expungement policies in disaster contexts would be particularly appropriate. If tenants are evicted only because their units were damaged by disasters—as was common in Bay County—and then made to wait anywhere from 1 to 3 years for their eviction records to be cleared, their ability to procure safe and stable housing after disasters would be seriously impeded.

Information is a final, powerful tool in reducing postdisaster evictions—for both tenants and landlords. As one example, a discussion with local legal service providers showed how information about tenants' rights, distributed at a crucial moment in a major Panama City apartment building,

allowed tenants to resist a push from management to vacate the building. As another example, they also suggested that landlords sometimes filed evictions in error, concerned about liability for unsanitary living conditions.

The research here illuminates the pressing challenges that renters face after disasters. In already tight housing markets where renters have little additional income to fall back on, the upheaval wrought by disasters is followed by increases in evictions. Perhaps even more than in nondisaster times, evictions after disasters raise daunting or even insuperable hurdles for low-income renters to regain housing stability. The complex interplay of climate change, environmental disasters, and housing is a particularly important area for future research and policy innovation as these challenges become more widespread.

## Notes

1. We recognize that the federal disaster declaration process considers multiple factors as set out in the federal regulations at 44 C.F.R. § 206.48 and is inherently political (Reeves, 2011; Salkowe & Chakraborty, 2009; Schmidtlein, Finch, & Cutter, 2008). Most disasters do not rise to the level of a federally declared disaster and do not qualify for federal assistance. Here we focus on the most severe 5% of federally declared disasters by value of property damage, which we believe includes those disasters most likely to have the largest effect on local housing markets and creates an unbiased sample of the most significant disasters over the study time period.
2. Much of the existing disaster relief and recovery infrastructure dates to the 1966 Disaster Relief Act (P.L. 89–769 (November 6, 1966)) and its subsequent amendments, particularly the Disaster Relief Act of 1974 (P.L. 93–288 (May 22, 1974)) and the Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 100–707 (November 23, 1988)). Recent revisions have included the Post-Katrina Emergency Management Reform Act of 2006 (PKEMRA, P.L. 109–295), the Sandy Recovery Improvement Act of 2013 (SRIA, Division B of P.L. 113–2), and the Disaster Recovery Reform Act of 2018 (DRRA) (P.L. 115–254 (October 5, 2018)).
3. The allocation of Community Development Block Grants for Disaster Recovery is authorized under Title I of the Housing and Community Development Act of 1974 (P.L. 93–383 (August 22, 1974)) and regulated by the federal regulations at 24 C.F.R. § 570.
4. This data set provides counts of eviction filings and completed evictions, and the filing and completed eviction rate. It also provides a count of rent-burdened households. We accessed the county-year file on September 19, 2018, and the most current version is available at https://evictionlab.org/, where an update entails a limited subset of validated records and the full set of records, the latter of which is the most current version of our data set. Modeling results are qualitatively parallel to ones we report when we substitute our data for the current, full set of eviction records. To account for outlying county-years (e.g., Los Angeles County), we replace the number of evictions in county-years in the top 0.01% with the number of evictions in the 99.99 quantile.
5. This data set provides panel data for disasters by year, county, and type (e.g., flood, fire). We accessed the file on April 18, 2019, which was available at https://cemhs.asu.edu/sheldus, where an updated version of the data is now available. Modeling results are qualitatively parallel to ones we report when we substitute our data for updated disaster records.
6. We fill in missing values for each county using the values from the subsequent census or survey year. We use values from subsequent censuses to populate missing values in the preceding one. We recognize that linear interpolation relies on the assumption that the measures change in a linear fashion between decades, which is not always true. But in the absence of annual data over the whole time period, we believe reliance on the common strategy of linear interpolation is the most appropriate approach.
7. This data set provides time-series data with county identifiers for population, share of non-Hispanic White and Black population, share of Hispanic population, share of households in poverty, share of population with bachelor's degree or higher, share of multifamily, vacant, and rental housing, median rent, and median home value. The file is available at https://www.brown.edu/academics/spatial-structures-in-social-sciences/diversity-and-disparities; we accessed it on April 11, 2019.
8. This data set provides data on valid, inspected, approved renter households, as well as amounts of assistance by type to those households. We accessed the file on April 12, 2019, and the most current version is available at https://www.fema.gov/data-feeds. To account for outlying county-years (e.g., Queens County after Hurricane Sandy), we replace the value of assistance in county-years in the top 0.01% with the value of assistance in the 99.99 quantile.

9. In the immediate years after a disaster, the demographics of an area change (Schultz & Elliott, 2013). The reliance only on pretreatment confounders is a limitation that may reduce the accuracy of the estimates in years following the disaster and warrants future research on this dimension.
10. Available at https://baycoclerk.com/court-records/case-search/.
11. The state enacted the Hurricane Michael Recovery Loan Program to provide low-interest mortgages and down payment assistance to qualifying applicants whose incomes were less than 140% of the area median income (applicants did not need to be first-time homebuyers to qualify). This program was recently restarted by Governor DeSantis, noting that the storm's damage called for "years and years of support" (Cassels, 2020). Additional relief efforts included a foreclosure counseling program and a recovery-specific $65 million expansion of the existing State Housing Initiatives Partnership program, which provides entitlement dollars to local governments that adopt a plan to produce affordable homeownership and rental housing for very low- to moderate-income Floridians (Florida Housing Finance Corporation, 2020). Although multifamily projects were eligible for these recovery funds, a minimum of 65% of the total funds were earmarked for homeownership projects (Ibid). Finally, the state approved $50 million in bridge loans to affordable housing developers in hurricane-affected counties and another $50 million in additional federal HOME fund allocations, the latter of which is expected to fund the construction of 200 affordable rental units (Ibid).

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## Appendix A . Missingness

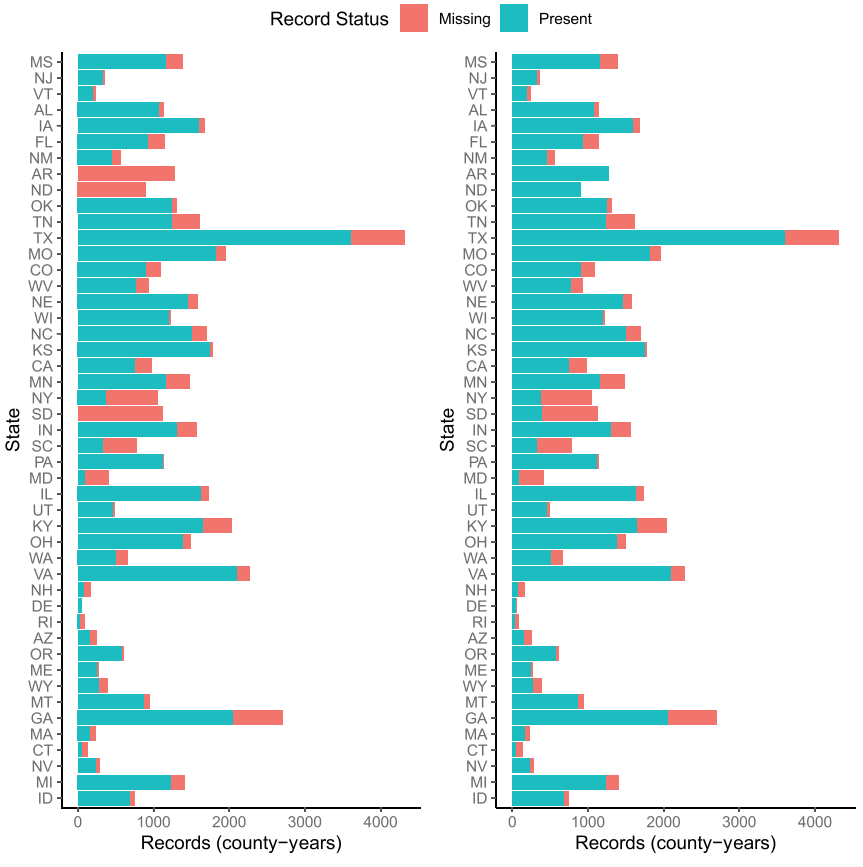


**Figure A1.** Data missingness and disaster damage by state.
*Note*. States are arranged, from top to bottom over the panel, in order from those with the most to the least disaster damage per capita.

## Appendix B. Additional Descriptives

**Table B1.** Quantiles by evictions.

| | 0–20% | 20–40% | 40–60% | 60–80% | 80–100% | Bay County |
|---|---|---|---|---|---|---|
| Counties | 551 | 550 | 551 | 551 | 551 | - |
| Evictions (mean 2000–2015) | | | | | | |
| Evictions | 1.31 | 9.16 | 34.1 | 118.11 | 739.69 | 646.5 |
| Eviction filing rate | 0.31 | 0.95 | 1.81 | 3.25 | 6.13 | 5.913 |
| Eviction filings | 1.81 | 12.88 | 46 | 189 | 1,488 | 1,557.63 |
| Eviction rate | 0.22 | 0.7 | 1.31 | 2.16 | 3.28 | 2.44 |
| Covariates (2015) | | | | | | |
| Population | 5,911 | 14,059.5 | 26,572 | 53,145 | 211,300 | 180,117 |
| Population density | 7.07 | 25.63 | 47.18 | 90.86 | 365.78 | 237.4 |
| % Households in poverty | 13.9 | 15.6 | 16.4 | 15.4 | 14.6 | 15.4 |
| % non-Hispanic White | 89.1 | 89.9 | 87.1 | 84 | 70.9 | 77.3 |
| % BA or higher | 12.7 | 10.9 | 11 | 12.7 | 17.8 | 14.4 |
| % Multifamily housing units | 2.5 | 3.3 | 4.4 | 6.4 | 13.7 | 24.4 |
| % Vacant housing units | 22.5 | 18.45 | 16.4 | 13.3 | 9.9 | 32.3 |
| % Owner-occupied units | 75 | 75.25 | 73.7 | 70.9 | 66.1 | 62.4 |
| Median rent ($) | 604 | 626.5 | 669 | 729 | 884 | 966 |
| Median home value ($) | 90,900 | 102,000 | 114,200 | 131,800 | 162,300 | 166,400 |
| % Rent burdened | 25.4 | 27.6 | 28.8 | 29.4 | 30.4 | 31.4 |
| Renter households | 594 | 1,423 | 2,861 | 6,164 | 26,581 | 28,590 |
| Exposure (sum 2000–2015) | | | | | | |
| Property damage ($1000s) | 0 | 538 | 2,686 | 9,582 | 69,518 | 70,355 |
| Extreme (2%) damage events | 0 | 0 | 0 | 0 | 0 | 0 |
| Extreme (5%) damage events | 0 | 0 | 0 | 0 | 0 | 1 |
| Extreme (10%) damage events | 0 | 0 | 0 | 0 | 0 | 2 |
| Extreme (25%) damage events | 0 | 0 | 1 | 1 | 1 | 4 |
| Any damage events | 2 | 3 | 3 | 3 | 3 | 6 |
| FEMA assistance (sum 2004–2015) | | | | | | |
| Valid renter households | 0 | 3 | 4 | 12 | 43 | 798 |
| Inspected renter households | 0 | 2 | 3 | 9 | 36 | 574 |
| Approved renter households | 0 | 1 | 1 | 5 | 17 | 322 |
| Rental amount renter households ($1000) | 0 | 0 | 0.83 | 3.11 | 16.86 | 171.557 |
| Other needs assistance amount renter households ($1000) | 0 | 0 | 0.44 | 5.12 | 23.02 | 497.431 |

## Appendix C. Marginal Effects Plot

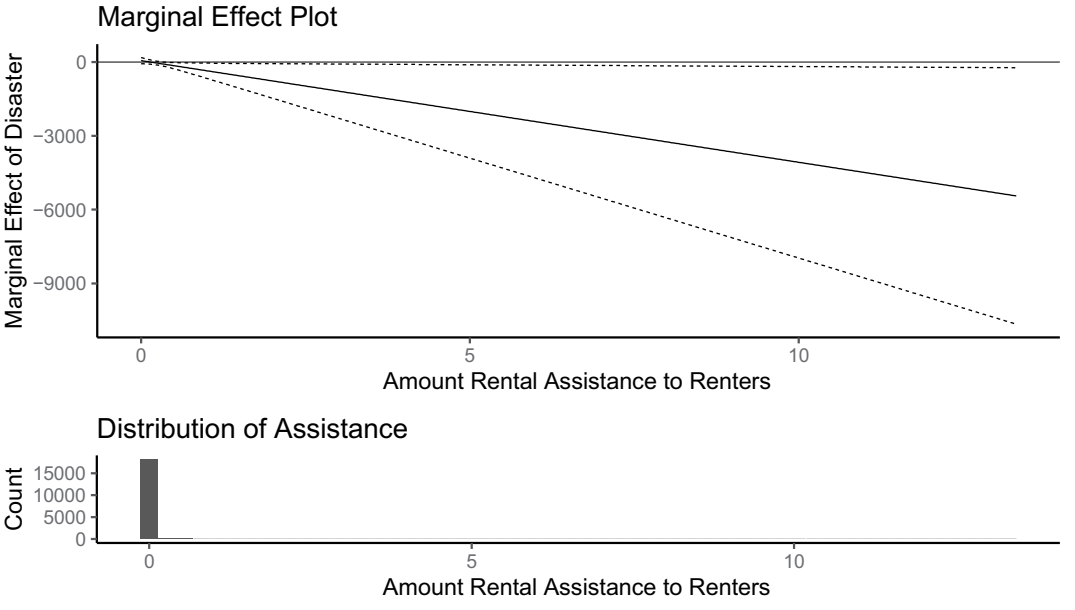


**Figure C1.** Marginal effect of disasters.

## Appendix D. Robustness Checks and Alternative Specifications

**Table D1.** Insights from filings.

| | Model A4.1.1 Filings | | Model A4.1.2 Filings | | Model A4.1.3 Filings | |
|---|---|---|---|---|---|---|
| Dependent | Estimate | *SE* | Estimate | *SE* | Estimate | *SE* |
| Severe disaster | − 49.38 | 83.22 | − 6.65 | 68.86 | − 42.23 | 110.1 |
| Severe disaster (t − 1) | 48.81 | 57.22 | 86.3 | 61 | 57.5 | 84.18 |
| Severe disaster (t − 2) | 39.04 | 49.95 | 61.74 | 47.43 | 26.03 | 58.78 |
| Severe disaster (t − 3) | 23.62 | 66.7 | 37.17 | 56.57 | − 42.41 | 76.83 |
| Severe disaster (t − 4) | 43.75 | 42.03 | 50.43 | 45.23 | − 14.58 | 60.63 |
| Pop. density | | | − 1.37 | 1.11 | − 0.25 | 2.24 |
| % Households in poverty | | | 1.74 | 1.92 | − 2.69 | 4.08 |
| % Pop. non-Hispanic White | | | − 31.34** | 10.9 | − 80.29** | 27.75 |
| % Pop. older than 25 with BA or higher | | | 1.43 | 8.19 | − 10.88 | 13.88 |
| % Multifamily housing units | | | − 0.09 | 7.99 | − 0.6 | 9.39 |
| % Vacant housing units | | | 0.97 | 2.89 | − 4.28 | 4.87 |
| % Owner-occupied units | | | 1.84 | 3.73 | − 1.88 | 4.3 |
| Median rent ($100s) | | | 20.79 | 17.1 | 9.68 | 25.68 |
| Median home value ($1000s) | | | − 2.7* | 1.33 | − 6.44* | 2.94 |
| % Rent-burdened households | | | 1.74* | 0.79 | 1.12 | 1.45 |
| Rental households | | | 0.03 | 0.03 | − 0.03 | 0.03 |
| Ratio of rental assistance ($1000s) to renter households | | | | | 79.81 | 384.96 |
| Ratio of rental assistance ($1000s) to renter households (t − 1) | | | | | 13.93 | 277.37 |
| Ratio of rental assistance ($1000s) to renter households (t − 2) | | | | | 43.93 | 133.67 |
| Ratio of rental assistance ($1000s) to renter households (t − 3) | | | | | − 27.79 | 70.5 |
| Ratio of rental assistance ($1000s) to renter households (t − 3) | | | | | 26.64 | 38.88 |
| Severe disaster × Ratio of rental assistance ($100s) to renter households | | | | | − 550.08 | 485.85 |
| Severe disaster (t − 1) Ratio of rental assistance ($1000s) to renter households (t − 1) | | | | | − 336.19 | 358.44 |
| Severe disaster (t − 2) × Ratio of rental assistance ($1000s) to renter households (t − 2) | | | | | − 319.87 | 226.37 |
| Severe disaster (t − 3) × Ratio of rental assistance ($1000s) to renter households (t − 3) | | | | | − 85.05 | 115.44 |
| Severe disaster (t − 3) × Ratio of rental assistance ($1000s) to renter households (t − 4) | | | | | − 85.1 | 87.1 |
| Fixed effect | Year, county | | Year, county | | Year, county | |
| $R^2$ | 0.00035 | | 0.01899 | | 0.02323 | |
| F statistic | 435.65 | | 442.13 | | 431.22 | |
| *DF* | 31,684 | | 31,674 | | 10,425 | |
| Notes: | Initial specification with filings | | Baseline specification with filings | | Aid specification with filings | |

*p* values: .001, ***; .01, **; .05, *; .1.

**Table D2.** Robustness of dependent—rate and adjusting for number of renter households.

| | Model A4.2.1 | | Model A4.2.2 | |
|---|---|---|---|---|
| | Eviction rate | | Evictions | |
| Dependent | Estimate | *SE* | Estimate | *SE* |
| Severe disaster | 0.06 | 0.05 | 98.55* | 41.1 |
| Severe disaster (t − 1) | 0.13** | 0.05 | 114.78** | 40.26 |
| Severe disaster (t − 2) | 0.08 | 0.05 | 97.88 | 51.29 |
| Severe disaster (t − 3) | 0.01 | 0.05 | 54.54 | 58.01 |
| Severe disaster (t − 4) | 0.04 | 0.04 | 40.4 | 45.62 |
| Population (Pop) density | 0*** | 0 | − 1.17 | 0.79 |
| % Households in poverty | − 0.01* | 0 | 2.11 | 1.23 |
| % Pop. non-Hispanic White | 0.01 | 0.01 | − 10.55 | 6.13 |
| % Pop. older than 25 with BA or higher | 0.04*** | 0.01 | 7.75 | 4.66 |
| % Multifamily housing units | − 0.01* | 0.01 | 5.25 | 6.35 |
| % Vacant housing units | 0.02*** | 0 | 4.69* | 2.15 |
| % Owner-occupied units | − 0.01 | 0 | 0 | 1.41 |
| Median rent ($100s) | 0.01 | 0.02 | 36.19*** | 9.42 |
| Median home value ($1000s) | 0 | 0 | − 1.25* | 0.6 |
| % Rent-burdened households | 0 | 0 | − 0.17 | 0.46 |
| Fixed effect | Year, county | | Year, county | |
| $R^2$ | 0.01191 | | 0.0243 | |
| F statistic | 72.38 | | 188.05 | |
| *DF* | 29,802 | | 29,802 | |
| Severe disaster | 0.06 | 0.05 | 98.55* | 41.1 |
| Notes: | Eviction rate | | Excluding number of renter households | |

*p* values: .001, ***; .01, **; .05, *; .1.

**Table D3.** Robustness of data—removing large counties and limiting to disaster-prone counties.

| | Model A4.3.1 | | Model A4.3.1 | |
|---|---|---|---|---|
| | Evictions | | Evictions | |
| Dependent | Estimate | *SE* | Estimate | *SE* |
| Severe disaster | 63.03 | 32.57 | 108.93 | 59.56 |
| Severe disaster (t − 1) | 67.02* | 33.76 | 142.77* | 57.78 |
| Severe disaster (t − 2) | 60.7 | 43.83 | 102 | 63.19 |
| Severe disaster (t − 3) | 35.03 | 46.04 | 73.08 | 74.87 |
| Severe disaster (t − 4) | 7.4 | 33.26 | 69.21 | 55.55 |
| Population (Pop) density | 0.27 | 0.34 | − 2.46* | 1.18 |
| % Households in poverty | 1.85 | 0.97 | − 2.05 | 5.94 |
| % Pop. non-Hispanic White | − 7.26* | 3.57 | − 0.84 | 21.1 |
| % Pop. older than 25 with BA or higher | 8.65** | 2.84 | 8.15 | 12.67 |
| % Multifamily housing units | 3.19 | 5 | 16.37 | 20.47 |
| % Vacant housing units | 4.79** | 1.76 | 13.94 | 9.93 |
| % Owner-occupied units | − 0.84 | 1.24 | 1.95 | 6.79 |
| Median rent ($100s) | 16.86** | 5.44 | 123.6** | 45.97 |
| Median home value ($1000s) | − 0.74* | 0.38 | − 3.91* | 1.87 |
| % Rent-burdened households | − 0.14 | 0.42 | − 0.84 | 2.54 |
| Rental households | − 0.01 | 0.01 | 0.01 | 0.01 |
| Fixed effect | Year, county | | Year, county | |
| $R^2$ | 0.01334 | | 0.05668 | |
| F statistic | 218.7 | | 136.67 | |
| *DF* | 29,685 | | 6193 | |
| Notes: | Counties <2 million | | Counties with two or more disasters in the top quartile for property damage between 2000 and 2015. | |

*p* values: .001, ***; .01, **; .05, *; .1, .

**Table D4.** Robustness of specification—placebo leads, state time trend, and additional lags.

| | Model A4.4.1 | | Mole A4.4.2 | | Model A4.4.3 | |
|---|---|---|---|---|---|---|
| | Evictions | | Evictions | | Evictions | |
| Dependent | Coefficient | *SE* | Coefficient | *SE* | Coefficient | *SE* |
| Severe disaster | 162.59* | 65.14 | 96.55* | 48.07 | 77.41 | 47.26 |
| Severe disaster (t − 1) | 185.66* | 73.93 | 112.36* | 49.14 | 58.35 | 32.07 |
| Severe disaster (t − 2) | 161.99* | 75.7 | 95.1 | 57.54 | 47.93 | 48.23 |
| Severe disaster (t − 3) | 115.8 | 81.23 | 50.74 | 64.86 | − 14.88 | 51.78 |
| Severe disaster (t − 4) | 76.03 | 59.3 | 40.04 | 50.95 | − 8.08 | 41.47 |
| Severe disaster (t + 1) | 87.79 | 66.67 | | | | |
| Severe disaster (t + 2) | 68.45 | 83.51 | | | | |
| Severe disaster (t + 3) | − 18.31 | 95.61 | | | | |
| Severe disaster (t + 4) | − 42.8 | 112.67 | | | | |
| Severe disaster (t − 5) | | | | | − 18.51 | 38.05 |
| Severe disaster (t − 6) | | | | | − 2 | 36.22 |
| Population (Pop) density | − 0.99 | 1.89 | − 1.17 | 0.79 | − 1.17 | 0.71 |
| % Households in poverty | − 0.25 | 4.78 | 0.63 | 1.34 | 1.41 | 0.94 |
| % Pop. non-Hispanic White | − 14.54 | 13.73 | − 14.47* | 5.66 | − 8.07 | 4.69 |
| % Pop. older than 25 with BA or higher | 9.72 | 8.31 | 8.01 | 4.5 | 5.49 | 3.9 |
| % Multifamily housing units | 20.67 | 22.82 | 6.58 | 6.36 | 4.52 | 6.51 |
| % Vacant housing units | 12.42 | 6.55 | 3.58 | 2.04 | 1.77 | 1.78 |
| % Owner-occupied units | 1.75 | 5.58 | 1.92 | 1.86 | − 0.06 | 1.38 |
| Median rent ($100s) | 69.31* | 30.28 | 28.59** | 10.33 | 24.93*** | 7.47 |
| Median home value ($1000s) | − 1.66 | 0.99 | − 1.18 | 0.73 | − 1.42* | 0.71 |
| % Rent-burdened households | 0.26 | 0.48 | − 0.54 | 0.5 | − 0.41 | 0.45 |
| Rental households | 0.02 | 0.01 | 0 | 0.01 | − 0.01 | 0.01 |
| Fixed effect | Year, county | | Year, county | | Year, county | |
| $R^2$ | 0.01644 | | 0.0327 | | 0.04237 | |
| F statistic | 117.79 | | 186.34 | | 206.96 | |
| *DF* | 19,798 | | 29,802 | | 24,883 | |
| Notes: | Leads | | State time trend | | Additional lags | |

*p* values: .001, ***; .01, **; .05, *; .1, .

**Table D5.** Insights from disaster types.

| | Model A4.5.1 | |
|---|---|---|
| | Evictions | |
| Dependent | Coefficient | *SE* |
| Severe flood disaster | 80.72 | 47.62 |
| Severe flood disaster (t − 1) | 64.43 | 41.44 |
| Severe flood disaster (t − 2) | 38.32 | 43.27 |
| Severe flood disaster (t − 3) | − 18.86 | 50.59 |
| Severe flood disaster (t − 4) | − 14.25 | 38.91 |
| Population (Pop) density | − 6.3 | 5.49 |
| % Households in poverty | 14.92 | 11.39 |
| % Pop. non-Hispanic White | − 35.89 | 22.34 |
| % Pop. older than 25 with BA or higher | 19.91 | 12.88 |
| % Multifamily housing units | 2.1 | 22.43 |
| % Vacant housing units | 14.89 | 8.65 |
| % Owner-occupied units | 20.25 | 15.06 |
| Median rent ($100s) | 137.91* | 59.25 |
| Median home value ($1000s) | − 4.35 | 2.53 |
| % Rent-burdened households | − 0.51 | 4.22 |
| Rental households | 0.02 | 0.02 |
| Fixed effect | Year, county | |
| $R^2$ | 0.04127 | |
| F statistic | 124.53 | |
| *DF* | 4045 | |
| Notes: | Severe disasters that are floods in counties that have ever experienced any flood | |

*p* values: .001, ***; .01, **; .05, *; .1.

**Table D6.** Robustness to state eviction reporting policies.

| | Model A4.6.1 | |
|---|---|---|
| | Evictions | |
| Dependent | Coefficient | *SE* |
| Severe disaster | 95.46* | 44.01 |
| Severe disaster (t − 1) | 111.92* | 43.93 |
| Severe disaster (t − 2) | 95.87 | 52.04 |
| Severe disaster (t − 3) | 53.04 | 58.52 |
| Severe disaster (t − 4) | 39.57 | 46.32 |
| Population (Pop) density | − 1.12 | 0.84 |
| % Households in poverty | 2.12 | 1.23 |
| % Pop. non-Hispanic White | − 11.11 | 5.69 |
| % Pop. older than 25 with BA or higher | 7.36 | 4.61 |
| % Multifamily housing units | 5.05 | 6.33 |
| % Vacant housing units | 4.54* | 2.23 |
| % Owner-occupied units | − 0.12 | 1.5 |
| Median rent ($100s) | 35.76*** | 9.86 |
| Median home value ($1000s) | − 1.21* | 0.58 |
| % Rent-burdened households | − 0.12 | 0.45 |
| Rental households | 0 | 0.01 |
| Fixed effect | Year, county, state | |
| $R^2$ | 0.02445 | |
| F statistic | 184.68 | |
| *DF* | 29,802 | |
| Notes: | State fixed effect | |

*p* values: .001, ***; .01, **; .05, *; .1.

## Appendix E

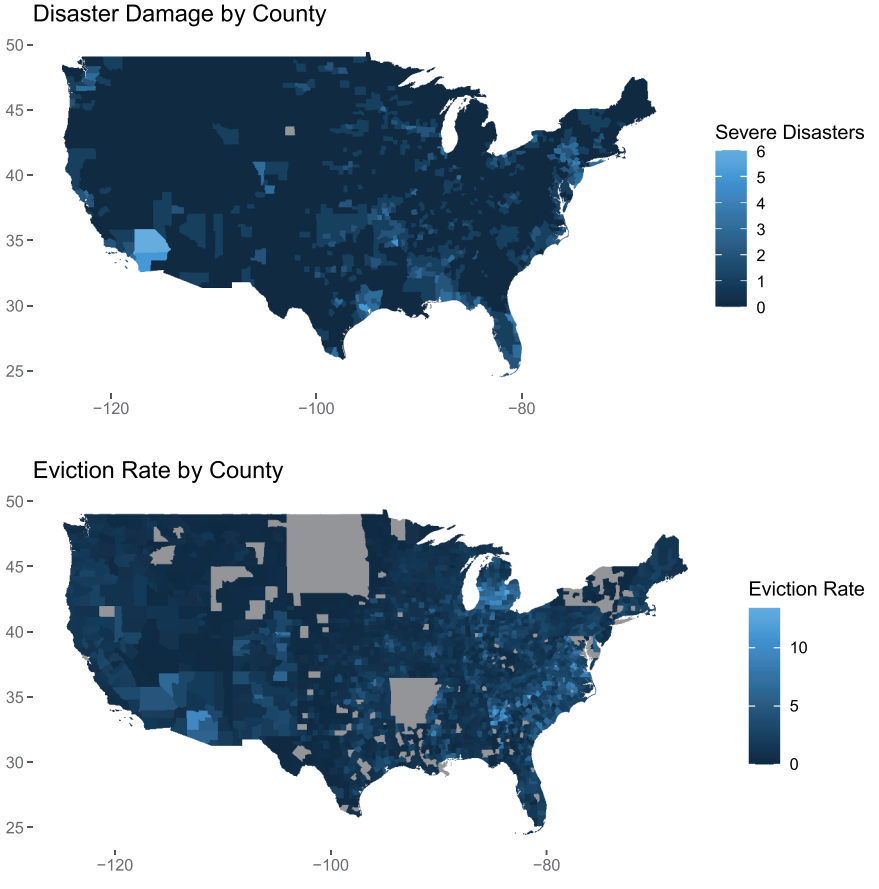


**Figure E1.** Disasters and evictions in the United States.
*Note*. Severe disaster in this context is a county-wide disaster in the top 10% nationally.

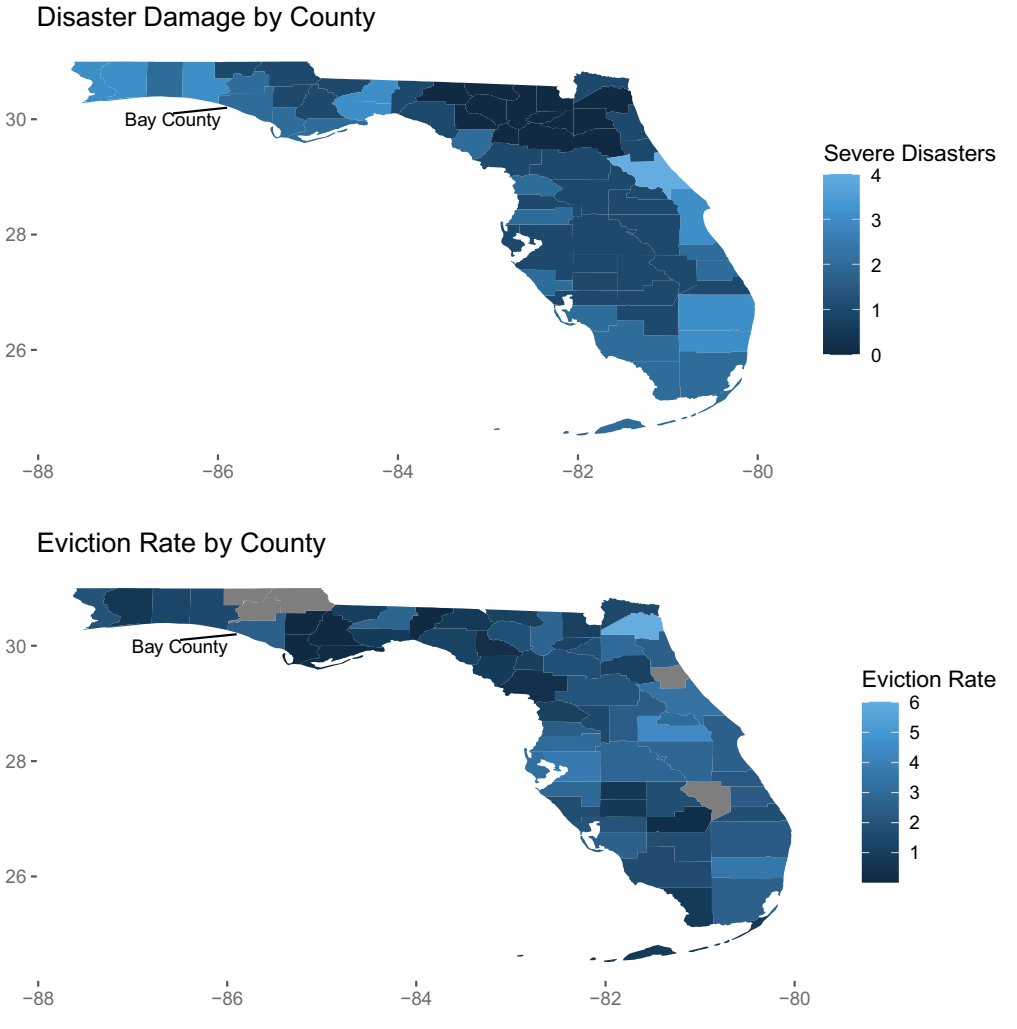


**Figure E2.** Disasters and evictions in the United States.
*Note*. Severe disaster in this context is a county-wide disaster in the top 10% nationally.