DISCUSSION PAPER SERIES

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Pandemic and Housing Vulnerability

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ABSTRACT

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Housing is a basic need and is intricately connected to a household's health and wellness. The current pandemic has exposed the housing vulnerability for certain subgroups of the population and further jeopardized these household's health and stability. Using the Household Pulse Survey launched by the US Census Bureau since April 2020, we examine the correlates of housing vulnerability during the pandemic. We explore both subjective and objective measures of vulnerability. In addition, we explore heterogeneity in the evolution of housing vulnerability along demographic characteristics such as ethnicity and housing type (renter vs owner) during the pandemic. Our results suggest that individuals perception on their housing vulnerability in the immediate future is on average higher than the objective evaluation of their current vulnerability. In addition, not being employed, lower levels of education and household size all increase home vulnerability. We also find significant heterogeneity across race in the evolution of vulnerability during the pandemic (2000-2022) with a "chilling effect" on Asians.

JEL Classification:	R2, R3, J10, I31
Keywords:	renter, homeowner, housing vulnerability, pandemic, ethnicity, Asian, COVID-19

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1 Introduction

COVID-19 pandemic left many households jobless, faced with tremendous anxiety and mental trauma, and acutely exposed to eviction and foreclosure. Congressional Research Service indicates that 65 million to 75 million people may have entered into extreme poverty in 2020 with 80 million more undernourished compared to pre-pandemic levels. In 2020 over 2 million households were behind on their mortgage payment by over 3 months and there was simultaneously a rental crisis with over 8 million household behind in their rent (March 2021 report by Consumer Financial Bureau).[1] Recent reports using survey data from the Census Bureau shows that in California rent crisis was disproportionately tilted towards the minorities with, Blacks and Latinxs being two- to two-and-a-half times more likely to be behind in their rental payments (Ong 2020). In this paper using the Pulse Survey Data, initiated as a result of the pandemic, we examine housing vulnerability during the pandemic for homeowners with mortgage as well as renters.

In the U.S., even before the onset of the pandemic in Feb-March 2020, it is well known that Blacks and Latinx face income, wealth and housing gap and also lack safety nets in the face of exogenous shocks and crisis[2]. With the onset of COVID-19 in April 2020, Blacks and Latinx were more significantly affected because they worked more in sectors and occupations that were hit most severely by the crisis. Using CPS microdata through April 2020, Fairlie et al.(2020) show that Latinx and African-Americans experienced the most increase in unemployment which was as high as 31.8 percent for Blacks and 31.4 percent for Latinx. Also, Hispanics and Blacks, the groups which were hardest hit with job losses, faced longer delays in getting re-employed (Cheng et al. 2020).[3]

We explore three main questions in our paper. First, What are the determinants and correlates of housing vulnerability during the 2020-2022 pandemic? As a sub-question we also examine how these determinants/correlates varies across subjective and objective measure? This question will shed light on what factors were playing a role in making one individual more housing vulnerable than others and how these varied across subjective and objective measures. The objective measure is the reality but subjective measures are very informative to look at during a pandemic as they capture people's vulnerability perception about their household's housing situation. Second, we examine if housing vulnerability changed over the pandemic years (2020-2021-2022) and are there differences across ethnic groups. It is important to consider how housing vulnerability changed across these groups over time

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[1]According to the CFB report, mortgage holders owed almost 90 billion in deferred principal, interest and taxes and insurance payments and the housing crisis was as acute as seen during the Great Recession.

[2]For example, see Coulson 1999, Gabriel and Rosenthal 2005, Mundra and Sharma 2015, and Mundra 2020

[3]In addition to the labor market insecurity there was increasing health and food crisis. COVID Hardship Watch from the Center on Budget and Policy show that in Oct 2021, 8% of white household did not have sufficient food the previous week versus 17% for Black and 16% for Latinos respectively.

given the preexisting housing inequality across ethnicity, and recent findings that suggest that minorities, including Asians, were more adversely affected in the labor market through the pandemic. Last, we analyze differences in housing vulnerability and its correlates across renters and homeowners. In addition, to these three questions, we explore the relationship between overall well-being and housing vulnerability by considering to what extent worry, a self-answered measure of well-being, asked in the Survey, is correlated with vulnerability and how this differs across homeowners and renters. To address these questions we make use of data from the Pulse Survey initiated at the start of the pandemic by the Census Bureau. We define an individual as housing vulnerable if they are facing hardships in paying their mortgage or rent. The richness of the Pulse Survey data enables us to use both subjective and objective measures of housing vulnerability. For the subjective measure the individuals were asked as to how confident they are that they will be able to pay the rent or mortgage next month. Whereas, for objective measure we use responses to the question as to whether home mortgage holders and renters are caught up in their mortgage and rent payment, respectively. Our basic methodology to examine these questions is a standard probit model with fixed effects.

Our results suggest that being employed, having high levels of income and education all significantly lower housing vulnerability. In contrast being self employed, a renter and having a larger household size increases the probability of being housing vulnerable. We find that individuals' subjective assessment of their vulnerability in the immediate future is significantly higher than an objective assessment of their housing vulnerability. Our results confirm prior literature that show heterogeneity in vulnerability across ethnicity with minority groups exhibiting a housing vulnerability gap when compared with Whites. However, we also highlight a unique increase in vulnerability for Asians during the pandemic. In particular, we find that between 2020 and 2021 there was a high increase in housing vulnerability for Asian when compared to Whites. In contrast, Hispanics did not experience an increase gap during this period. Blacks also experienced an increase from 2020-2021 in the gap compared to Whites but the increase was less than the increase for Asians. When we consider renters and mortgage holders separately, we still note the significant increase in vulnerability for Asians. For mortgage holders we note that only Asians experienced an increase in housing vulnerability compared to Whites from 2020 to 2021. No increase is noted for Blacks with mortgages. However, the biggest increase in vulnerability between 2020 and 2021 is for Asian renters. While Black renters experienced a 9.5% increase from 2020-2021 in housing vulnerability compared to White non-Hispanic, Asian renters experienced a 20% increase. Given Asian and White renters faced similar housing vulnerability at start of the pandemic, the marked increase for Asian in vulnerability by May 2021 suggests that Asian

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renters as well as homeowners with mortgage payments, faced a chilling effect through the pandemic which requires further research investigation.

Given the preexisting housing gap across race, income and gender in the U.S., it is important to understand to what extent the pandemic exacerbated housing inequality. Our paper focused on housing vulnerability through the pandemic fills this gap. Our paper also contributes to the literature by examining how housing vulnerability differed across renters and homeowners with mortgage payments. We highlight the much higher housing insecurity renters faced through the pandemic despite the programs put in place by the government. Finally, our paper contributes to the literature by being the first to highlight the significant increase in vulnerability faced by Asian Americans during the pandemic years.

The rest of our paper proceeds as follows. Section 2 is discusses the background and relevant literature review. In section 3 we examine the data and present some descriptive analysis. In section 4 we present our empirical model. Our results are summarized in section 5. We conclude and provide next steps in section 6.

2 Background and Relevant Literature Review

COVID-19 created significant economic, social and well being impacts globally. New research around the globe is showing that when communities face infectious disease their resilience and health outcomes are dependent on their housing and social vulnerability including adequacy of housing in the face of social distancing (Horne et al. 2021). There is recent evidence suggesting that the COVID-19 pandemic disproportionately affected Blacks and Hispanics, in both labor and housing market hardships (Fairlie et al. 2020, Kapman et al. 2020, Chun et al. 2022). In exploring how housing vulnerability changed over the Pandemic in the U.S. we particularly focus on how housing vulnerability changed for minorities through 2020-2022.

The lock downs measures put in place by most governments worldwide during the early months of the pandemic, further heightened the important role of housing. In response to the negative impacts of the COVID-19 pandemic, there were global efforts by governments and institutions to provide economic and housing relief (Malpazzi 2021). In the U.S. the CARES Act eviction moratorium began on March 27, 2020, and ended on July 24, 2020. This was followed by the Center for Disease Control (CDC) eviction moratorium, put in place September 4, 2020, which through further legislation was extended until June 30, 2021. The CARES Act also provided opportunities for forbearance. In particular, mortgage holders had the option to suspend mortgage payment for up to twelve months.[4] In addition, to these two relief for homeowners and renters at the federal level, different states passed their

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[4]Requesting forbearance was linked primarily with loans backed by Fannie Mae, Freddie Mac, or the federal government. Mortgage relief for others was limited and varied across states.

own relief programs at various points in time during the pandemic.[5]

There is a growing literature examining the effects of the pandemic and government efforts during the pandemic on housing insecurity. For example, Enriquez and Goldstein (2020) show that low income households faced more job loses and new debt accrual through the pandemic and faced higher food and housing insecurity. An et al.(2020) on the other hand find that rental relief programs during the pandemic helped households and they were able to reduce their eviction rates and allocate more funds to immediate consumption such as food. In addition, the moratorium reduced their food insecurity and mental stress. However An et al. (2022) also show that pandemic did increase the financial and housing inequalities in the U.S. for lower income borrowers. They also note that the forbearance programs put in place by the government helped minorities and low income borrowers who took the forbearance at higher rates, thus reducing their delinquency rates.

Despite the aforementioned studies that suggest positive effects of government relief programs, there is also evidence that many minority groups were unable to access and benefit from these programs- sort of chilling effect for certain groups, particularly Asians and immigrants. Buchanan et al.(2022) using data collected form interviewing immigrants families in Midwest find that new immigrant families not only suffered severe job loss due to the sector they were working in, followed by severe housing hardships, but also lacked skills on how to cope with the financial crisis including how to access the government relief in place. They particularly lacked technology and English language skills needed to cope with the financial hardships created by the pandemic. In another report from California, data from Household Pulse Survey and Emergency Rental Assistance Program show that there are significant barriers in accessing the safety net programs, particularly the rental moratorium in CA primarily due to language barriers and immigration status.[6] It is important to highlight that Asians which is usually considered a model minority, and immigrants groups generally also faced disproportionate economic hardships during the pandemic because many were involved in

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[5] "The CARES Act eviction moratorium applied to federally related properties, which the act defined as properties participating in federal assistance programs or with federally backed financing. Researchers estimate the CARES Act eviction moratorium applied to between 28% and 46% of occupied rental units nationally. The CDC eviction moratorium applies to all renters who attest to meeting income and other eligibility criteria set out in the order, which include having made all efforts to obtain government assistance for rent and being at risk of homelessness or overcrowded housing conditions upon eviction. Renters must assert their right to protection under the order by submitting a signed declaration of eligibility to their landlords. The CARES Act eviction moratorium prohibited landlords from charging fees or penalties for unpaid rent during the period of the moratorium. The law did not forgive unpaid rent amounts. The CDC eviction moratorium does not prohibit landlords from charging fees or penalties for unpaid rent and does not forgive unpaid rent amounts.Covered tenants could not be forced to vacate, and landlords could not file notices to vacate, until 30 days after the expiration of the moratorium (August 23, 2020). The CDC moratorium does not address notices to vacate." McCarty et al.(2020)

[6] This report for California was in conjunction with Paul M. Ong, Director of UCLA Center for Neighborhood Knowledge, the UCLA Asian American Studies Center, and the UCLA Chicano Center. The report states that- "Immigrants are generally distrustful of government programs, and immigrants who are not yet naturalized may be concerned that their participation in safety-net programs may identify them as a public charge. Our results echo recent findings showing that barriers to access—for instance, difficulty accessing the online application, delays in approval, and inadequate language access—have prevented many struggling renters from benefiting from ERAP." https://latino.ucla.edu/research/renter-insecurity - Covid-19/

small businesses that were adversely affected. Even though there were huge relief funds such as $25 billion for Emergency Rental Assistance Programs, many Asians were unable to access these loans. Explanations for access difficulties include language and cultural barriers, as well as discrimination and xenophobia such as "Asian Hate" during COVID (Gover 2020). One of our main focus in this paper is to examine the evolution of housing vulnerability across different ethnic groups (Blacks, Hispanic and Asians) during 2020-2022, which will shed more light on this issue. [7]

Our subsidiary question examining the correlation between overall well being and housing vulnerability is very important to consider during the pandemic because the scale of devastation and global impact was unprecedented. Together with lock down measures, social distancing, severe economic contraction, and financial hardships leading to food, housing and health hardships, people faced ample issues that could elicit anxiety and worry. We are able to capture worry leveraging a question from the Pulse Survey that allows respondents to self-report how worried they are.

There is increasing findings of mental health issues during the pandemic (Huato and Chavez 2021, Kim and Kim 2022). Bushman and Mehdipanah (2021) provide evidence of a relationship between housing tenure and health during COVID. After controlling for various demographic and socio-economic factors they found that compared to homeowners who have no mortgage debt, homeowners with mortgage debt report worse health outcomes. These worse outcomes could be linked with worrying and anxiety. Worrying could also be heightened for certain groups that faced increased scrutiny due to the origin and nature of the Corona virus. Recent research from the U.S. shows that in addition to the economic hardship created by the pandemic, Asians faced discrimination and increased personal health concerns, coupled with other factors such as economic anxiety. These factors adversely affected their overall well being and made them more vulnerable through and after the pandemic (Gover et al., 2020; S. W. Pan et al., 2021a).

Given the negative effect of worry on health related outcomes, exploring the question whether housing vulnerability is correlated with worry can provide important insights on how health, overall well being and housing vulnerability are interrelated and if there are some mitigating factors that helped one group over the other. Moreover, we are able to examine if worry is more strongly associated with either the subjective or objective measure.

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[7]A recent 2020 report by McKinsey shows that many Asians are small business owners- with 1 out of every 6 adult owning a business that was severely impacted during COVID. In addition, the report notes that *Asians are a wide heterogeneous group and many do not speak English and were not able to access the details on the safety net programs available during the pandemic, which was not available in their languages. Simultaneously, this group was also facing discrimination both socially and in the economy during the pandemic. See COVID-19 and advancing Asian American recovery, McKinsey and Company August 2020- https://www.mckinsey.com/industries/public-and-social-sector/our-insights/covid-19-and-advancing-asian-american-recovery*

3 Data and Descriptive Statistics

To explore our questions of interest, we make use of the US Census Bureau's Household Pulse Survey (HPS). The Household pulse survey is an experimental survey that was initiated at the onset of the pandemic. According to the US Bureau of Statistics, it was designed to provide near-real time data on the impact of the coronavirus pandemic. HPS has been collected in phases since April 2020 and weekly public use files (PUF) are disseminated soon after it is collected.

One of the benefits of the HPS is its research design that makes it easy to quickly and efficiently deploy the detailed data collected just weeks after collection. HPS is meant to be representative of the entire population of the U.S but the questionnaire was only available in English and Spanish which could lead to an under representation of immigrants or citizens who are non-English and Spanish speaking.[8]

To derive the sample a number of addresses were scientifically selected from across the country. Among the selected households those who agreed to participate had to complete a survey. The survey is online and is 20 minutes in length. The HPS is a rich dataset that includes core demographic and economic characteristics. It also focuses heavily on questions relating to the pandemic and its effects on individuals' daily lives. The main goal of this survey is to provide timely data that will capture the scope of the effect of the pandemic on individual, households and communities.

For our research, we derive weekly microdata file with individual responses to survey questions from three phases of the survey: Phase 1, Phase 3:1, Phase 3:4. In particular, we make use of the PUF from HPS for Week 1 collected April 23 – May 5 2020, Week 29 collected April 28 – May 10 2021, and Week 45 collected April 27 – May 9, 2022. We specifically choose these weeks so that we can capture a beginning period were policy impact would be limited, a period were policy impact would be more effectively diffused and a period post these federal programs.[9] Our choice of these three weeks of PUF is intentional. Our goal is to capture individuals responses from the beginning/ early months of the pandemic, a year later and two years later.

One of the strength of the HPS is that the Census Bureau is constantly learning from previous cycles of the survey and using the information to strengthen the research design in future cycles to improve the survey. A challenge to this constant process of assessing the data is that some questions are not available in all weekly PUFS. We handle this challenge by only including control variables we have data on for the three periods we are focused on

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[8]The HPS data include weights to attenuate this issue. We leverage these weights in our econometric analysis to improve the external validity of our results.

[9]Each weekly release includes a data dictionary, a replicate weight data file and the actual PUF. The files are in CVS format and we convert the CVS PUF files to Stata files to be able to implement our analysis.

in our analysis.

To examine the correlates of housing vulnerability, we construct two measures of vulnerability from the HPS data. The first is based on survey participants response to the question "How confident are you that your household will be able to pay your next rent or mortgage payment on time?" If individuals chose they were not going to pay or had deferred payment, not confident or just slightly confident, they were coded as vulnerable. On the other hand, if the respondent selected that they were moderately confident or highly confident, they were coded as not vulnerable. This first measure is our subjective measure of housing vulnerability. In particular vulnerability is determined based on individuals' evaluation of their ability to pay their next rent or mortgage in a timely manner. While this evaluation has to be linked with an individual's financial state, there is a part of this evaluation that could be stochastic. In addition, individuals' personalities, background and past experiences can affect their evaluation, creating a variation across people on how confident they are in their ability to pay even with the same constraints and endowments. This subjective measure may be viewed as somewhat measuring future vulnerability. However, since rent and mortgages are typically paid monthly, at the start of the month, the subjective measure can only provide information about vulnerability within a 0-4 weeks span.

Our second measure of housing vulnerability can be viewed as objective. We construct it based on a response to two different questions. Survey participants who were renting were asked "Is this household currently caught up on rent payments?" If a household responded no, they were coded as vulnerable and if their response was yes the individual is classified as not vulnerable. Similarly, individuals living in a home with a mortgage were asked "Is this household currently caught up on mortgage payments?" As above, if the household responded no they are coded as vulnerable. Otherwise they are coded as not vulnerable.

We use both an objective and subjective measure because both types of measures have their pros and cons. While objective measures are typically preferred, an individual's perception, which is reflected in subjective measures could be informative. Moreover, subjective measures are often good predictor of other objective outcomes.[10]

Table 1 provides a summary of housing vulnerability using both the subjective and objective measures across certain demographic groups. We present this summary of housing vulnerability separately for those paying rent and those with mortgages.

Table 1 highlights a few trends. First, when we measure household vulnerability using the subjective measure, the percentage of a group who are vulnerable is consistently higher than when we use the objective measure for the same group. The second major finding from the table is that across the demographic categories we consider (ethnicity, education and

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[10]See Cleary (1997).

Table 1: Percent Housing Vulnerable: Race, Education, Sector

Panel A	White non-Hispanic	Black-non-Hispanic	Hispanic	Asian non-Hispanic	Mixed Race
Mortgage Subjective	7.63	19.08	17.34	14.02	13.01
Rent Subjective	16.7	36.2	32.99	20.09	27.3
Mortgage Objective	4.91	13.47	10.36	11.24	9.36
Rent Objective	8.76	23.44	16.37	13.48	16.39
Panel B	High School	Some College	Associate	Bachelor	Graduate
Mortgage Subjective	18	13.01	12.76	7.16	5.34
Rent Subjective	34.39	27.03	26.83	14.17	10.07
					-
Mortgage Objective	11.04	8.63	7.83	4.75	3.93
Renter Objective	18.82	15.1	14.77	7.76	6.24
Panel C	Government	Private	Non-profit	Self-employed	Work for Family Business
Mortgage Subjective	6.25	7.61	6.48	10.06	11.22
Rent Subjective	13.75	18	12.55	21.74	22.92
Mortgage Objective	4.19	5.3	3.98	7	6.81
Rent Objective	7.63	10.05	6.65	13.43	12.07

work type), the housing vulnerable share (objective or subjective) is higher for renters than mortgage holders. For example if we focus on the objective measure in Panel A, 10.36% of Hispanic mortgage holders are vulnerable in contrast 16.37% of renters. If instead we look across education level in Panel B and focus again on the objective measure, we note that 11% of mortgage holders whose highest education is high school or less are housing vulnerable in contrast to 18.82% for renters. Across work type and focusing again on the objective measure, we find only 5.3% of those who work in the private sector and have mortgages are vulnerable in contrast to 10.05% for renters. It is possible that these differences across renters and mortgage holders is a reflection of socioeconomic factors. [11]

The third main finding from this table is useful for policy targeting. Across subjective and objective measures and for both renters and mortgage holders, Black non Hispanic have the highest percentage of housing vulnerable individuals while White non Hispanic have the lowest. For example, using the subjective measure 36.2% of Black non Hispanic renters are housing vulnerable in contrast only 16.7% of Whites non Hispanic renters are vulnerable. Another group with high levels of vulnerability are Hispanics (32.99% for the subjective measure). With respect to education levels, Panel B highlights that, those with a high school education or less (renter or mortgage) have the highest share who are housing vulnerable (renter: 34.39% subjective measure and 18.82% objective measure). Those with graduate degrees, not surprisingly, have the lowest share of housing vulnerability. When we look across work types, we note some nuances. First, if we focus on the subjective measure, it appears those who work for a family business have the highest percent vulnerable 11.23% for mortgage holders and 22.92% for renters. However when we consider the objective measure, those who are self-employed have a higher percent vulnerable than those who work for a family business (renters 7% versus 6.81% and mortgage 13.43% vs 12.07%). We explore in

[11]In our econometric analysis we control for socioeconomic factors and verify if these gap's between renters and mortgage holders in the share that are vulnerable persists.

more depth in this paper, vulnerability for the self-employed.
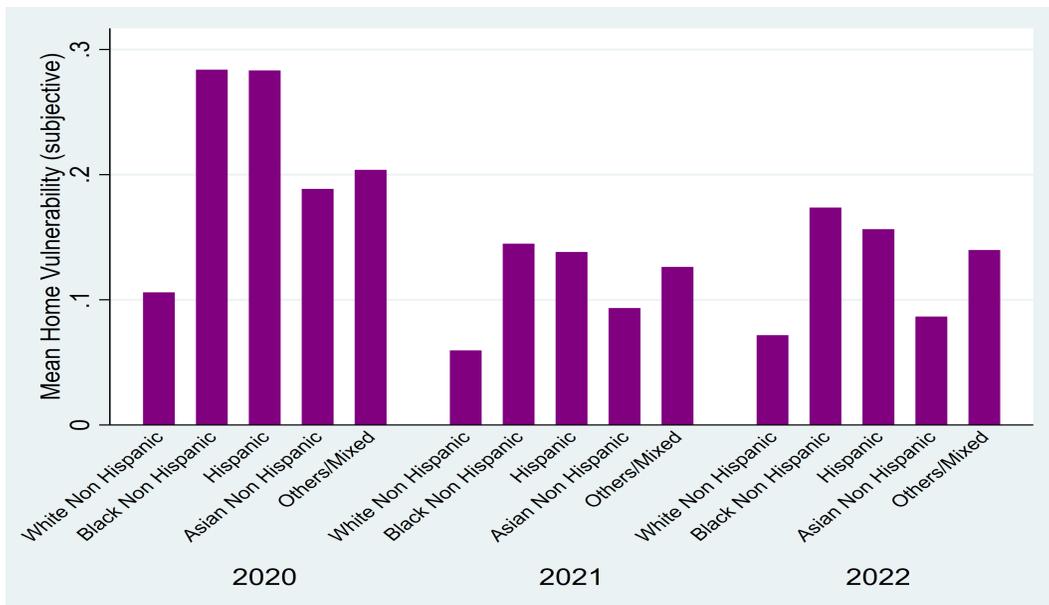
Figure 1: Home Vulnerability (subjective measure) over the Pandemic by Race
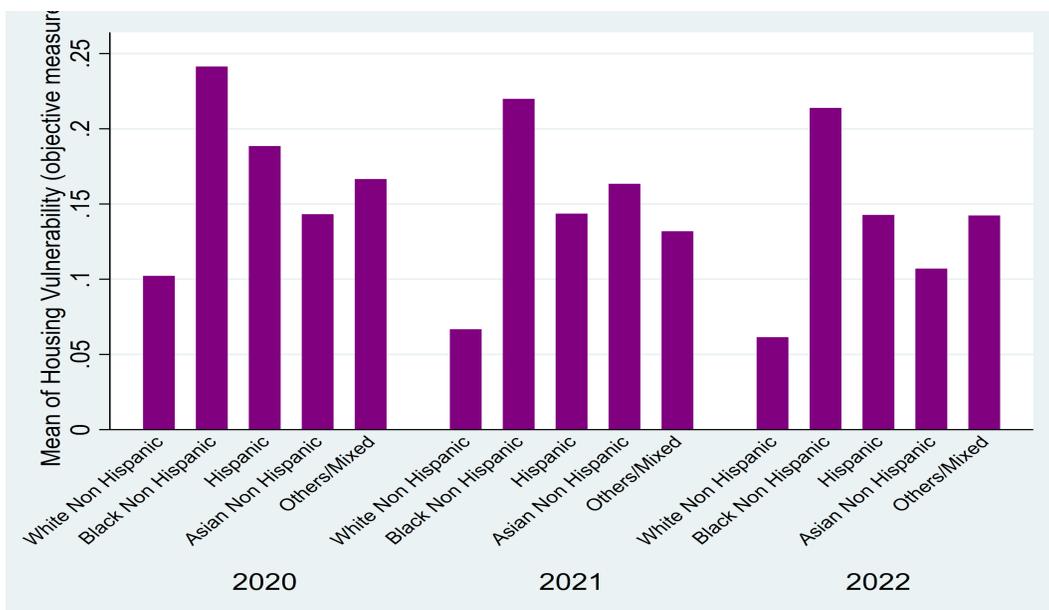
Figure 2: Home Vulnerability (objective measure) over the Pandemic by Race

Given our interest in how home vulnerability evolved over the pandemic, we summarize changes in housing vulnerability using both measures of vulnerability across time. Figure 1 and 2 summarizes these changes over time and across race. We note that home vulnerability using both measures was highest in 2020 across race and declined in 2021. Focusing on the objective measure, the decline in housing vulnerability varied across race and was not substantial for Asians compared to other groups. In 2022 home vulnerability appears to have increased when we focus on the subjective measure. However, when we focus on the objectives measure in Figure 2, home vulnerability continues to decline in 2022 even though the decline is not substantial.

In Figure 3 and 4 we focus on the housing vulnerability trends across education attainment levels.[12] Notice that just like with Figures 1 and 2, housing vulnerability declined

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[12]Going forward for brevity, we will refer to housing vulnerability simply as vulnerability.
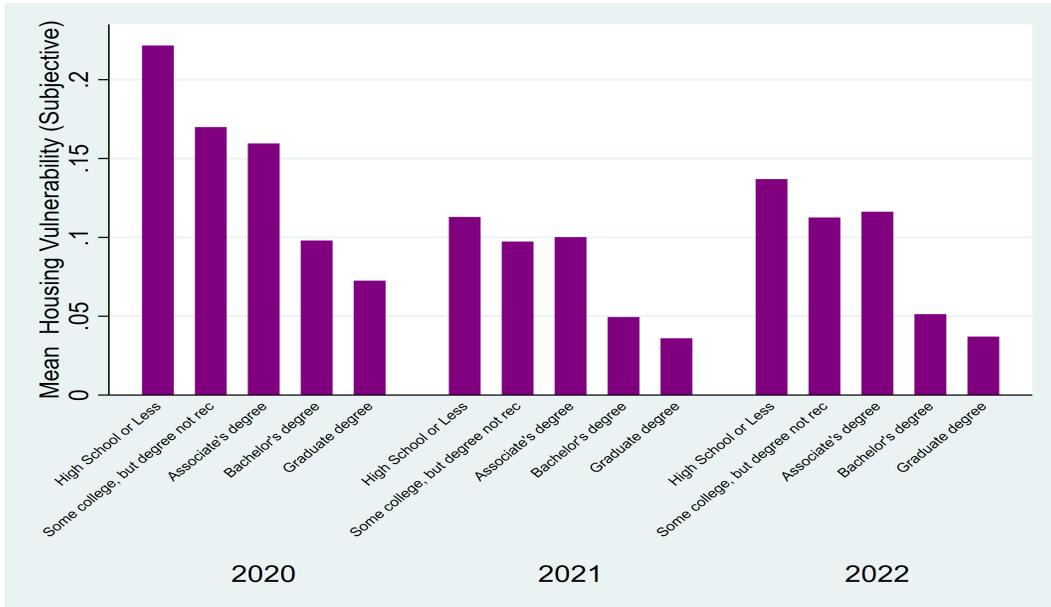
Figure 3: Home Vulnerability by Education Level (subjective measure)

significantly from 2020 to 2021 but declined only slightly from 2021 to 2022. The only exception to this trend was for those with some college without a degree. Housing vulnerability increased between 2021 and 2022 for this group. Despite this increase between 2021 and 2022, this group had the highest decline in vulnerability over this period (5% points). Next highest decline in home vulnerability is for high school group with less experience (4 percentage points), followed closely by those with an associate degree.
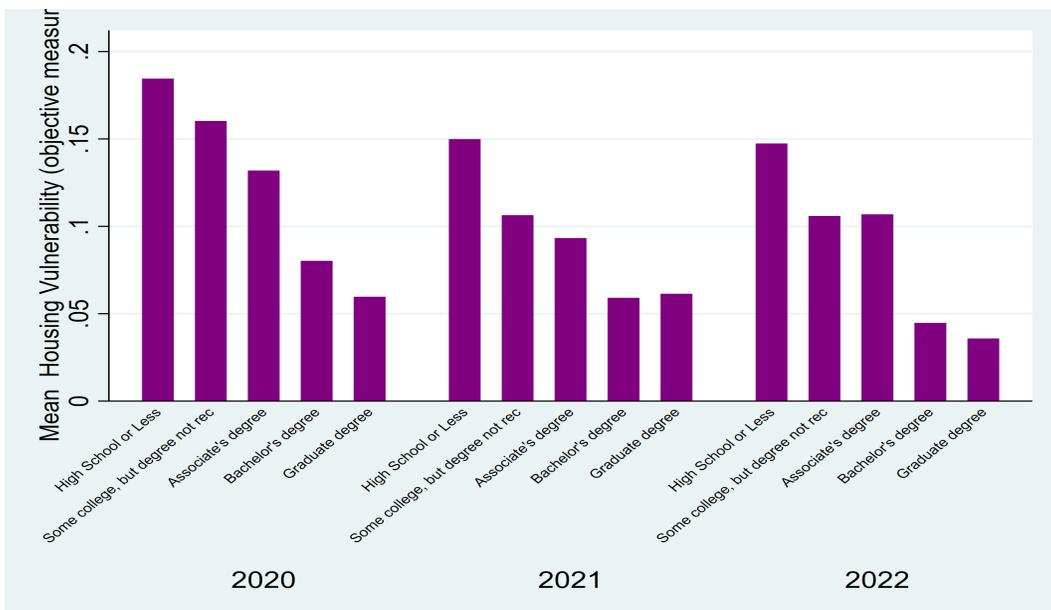
Figure 4: Home Vulnerability by Education Level(objective measure)

In Figure 5 we explore the heterogeneity across race in the sample of individuals who are objectively not vulnerable, meaning they are cut up with rent/mortgage pavements, but are vulnerable to the extent that they are not confident in their ability to pay the next rent or mortgage. This figure shows that 19% of Blacks and 18% of Hispanic who were objectively not vulnerable at the time of survey are subjectively vulnerable. For Asian this share is about 12% while for White this share is only 6.7%.

In Table 2 we explore further this sub-sample of individuals who are objectively not

Table 2: By Group: Percent who are Objectively Not Vulnerable but are Subjectively Vulnerable

Panel A	White non-Hispanic	Black-non-Hispanic	Hispanic	Asian non-Hispanic	Mixed Race
Mortgage	4.76	12.06	12.60	10.23	7.96
Rent	11.7	25.9	25.48	16.17	19.29
Panel B	Not Employed	Other Employment	Self Employed	Retired	
Mortgage	10.53	4.82	6.18	4.04	
Rent	24.32	11.91	15.23	8.67	
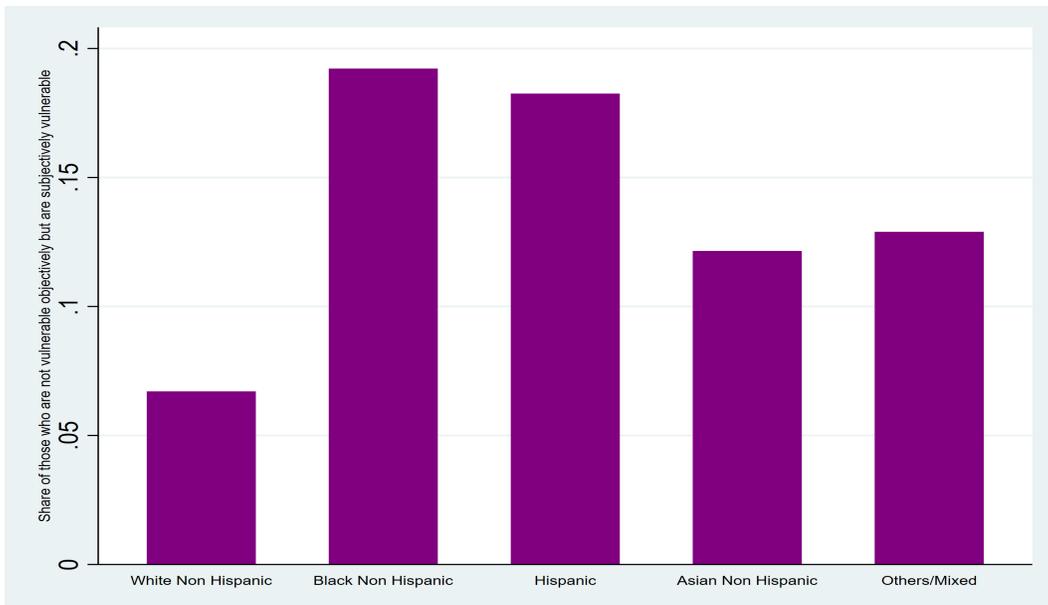
Figure 5: By Race: Share of Individuals who are objectively not vulnerable but subjectively vulnerable

vulnerable but perceive themselves as vulnerable breaking this sample down by renters and mortgage holders. Panel A is divided by ethnicity and panel B is divided by employment status. We note that across race and employment status, a higher percent of individuals who are renters fall into this group versus mortgage holders. For example, among Black renters who are objectively not vulnerable, 25.9% still perceive themselves as vulnerable compared to only 12% of Black mortgage holders who are objectively not vulnerable. The heterogeneity across race in this share especially for renters comes as a surprise but could be a reflection of wealth which differs across race. In particular, more wealthy people are less likely to be worried about the future because they can leverage their wealth to serve as a cushion following exogenous shocks such as job loss.

We also find that among those who are objectively not vulnerable, 24.3% of renters who are not employed are subjectively vulnerable. This share is higher than the share of renters in other employment status groups who are objectively not vulnerable but subjectively vulnerable. In particular, only 8.7% of retired, 15.2% of self-employed and 11.9% of Other employed 11.9% fall into this category. It is not surprising that those who are unemployed may be concerned about making future rent payments. However, the gap between the share of self-employed and other employed renter who are objective not vulnerable but subjectively signal they are vulnerable requires further exploration. We see similar trends when we consider mortgage holders who are objectively not vulnerable but subjectively vulnerable,

though just as noted above, the shares are much smaller. For example, for not-employed mortgage holder who are objectively not vulnerable only 10.53% are subjectively vulnerable which is a much smaller share than noted for renters, and for the self-employed the share is 6.2%. The gap between renters and mortgage holders may be a reflection of wealth. During the pandemic house prices rose significantly and the housing market was tight with demand exceeding supply. This led to a significant increase in home value, home equity and wealth for homeowners. This substantial increase in wealth is important because even if a person with a mortgage lost a job or was afraid of losing a job, they still had the option to sell their home and move to an apartment and leverage the built up equity. The existence of that option for mortgage holders can affect their perception on their future housing vulnerability. Renters on the other hand do not have this option.

In Figures 6 and 7 we explore the relationship between ethnicity, worry and home vulnerability. Individuals were asked about their level of worry over the two weeks period preceding the survey. Respondent could choose out of 4 options Not worrying at all, worrying several days, worrying more than 7 days in the 2 week period and worrying almost or everyday. Given the negative role worrying has on physical and mental health (Watkins 2008), presenting this subjective measure has value. Figures 5 and 6 highlight a few things. First within race, those who are worrying nearly every day or more than half of the days, not surprisingly are those who are on average more housing vulnerable. Second, regardless of the level of worry, Black non Hispanic are on average more housing vulnerable than every other ethnic group. Also, when we focus on those who are worrying almost everyday the gap in share of Hispanics and Blacks who are vulnerable compared the other groups is substantial whether we look at the subjective or the objective measure. This could suggest a closer link between housing vulnerability and worrying for Blacks and Hispanic.
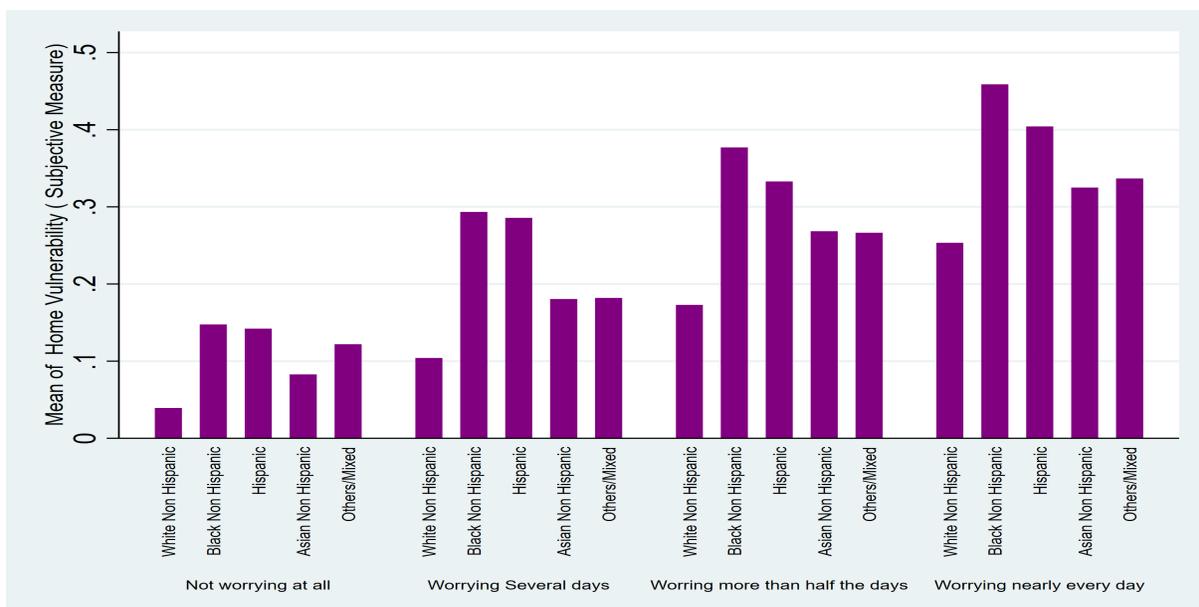
Figure 6: Home Vulnerability, Worry and Ethnicity(subjective measure)
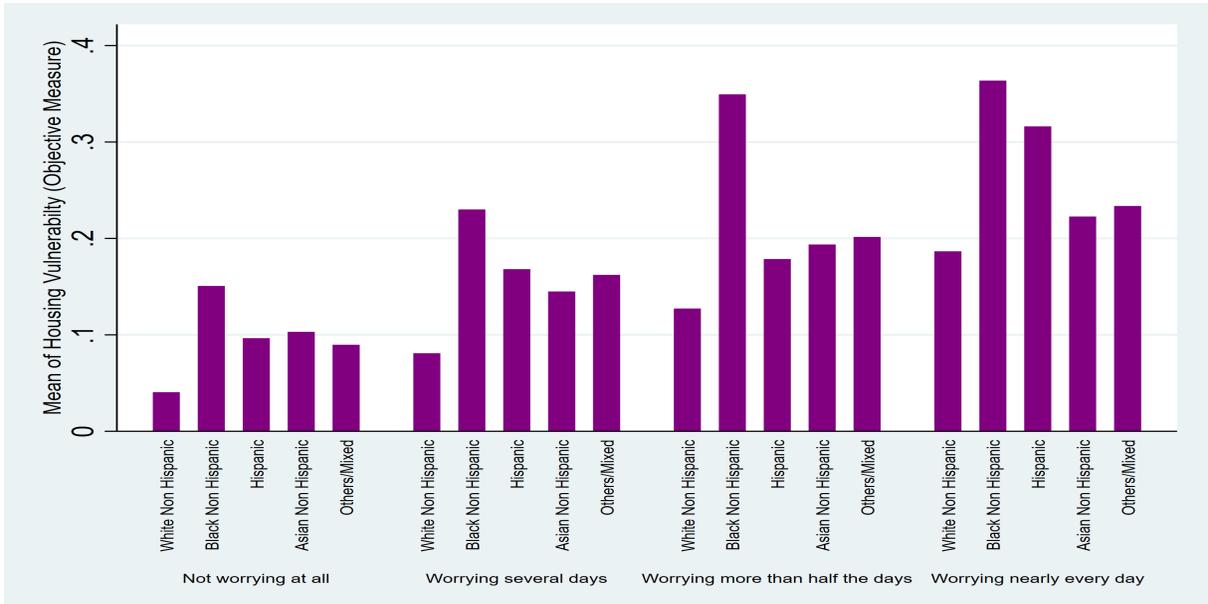
Figure 7: Home Vulnerability, Worry and Ethnicity(objective measure)

4   Empirical Framework

To examine the correlates of home vulnerability during the pandemic in the U.S, we estimate the following equation using a probit model and derive the marginal effects for our variables of interest.

$$\Pr(V_i = 1) = \mathbf{X}'\alpha + \delta_s + \psi_t + \varepsilon_i$$

In the model above V is a binary variable that can take the value of 0 or 1. 0 if an individual is not vulnerable and 1 if the individual is vulnerable. We estimate different permutations of this equation depending on our question of interest and what measure of vulnerability we are using either subjective or objective. For example in some cases we focus solely on those who rent or hold a mortgage and in other cases we include those who rent, live for free, own their homes without a mortgage and those who hold mortgages. While we vary certain variables depending on the question we are exploring, for most our analysis, our vector X includes age, estimate of years of schooling, age^2, dummies for ethnicity, control for worry, household size, dummies for marital status, work type, state fixed effects, year fixed effects, gender, the number of household members below 18 and a proxy for income. We use a proxy for income because PUS data does not have actual income numbers for individuals. Rather it provides income ranges and individuals select the range where there income fall into. We convert these levels into a semi-continuous income proxy variable. All our specification includes year fixed effects (ψ_t) and state level effects (δ_s).[13]

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[13]We implementing this by assigning to each individual the maximum income of the category they belong to, We then convert these income level to real values using CPS CPI levels and find the natural log.

5 Results

The first question we examine is focused on exploring the correlates of housing vulnerability during the pandemic. The marginal effects from the probit model are summarized in Table 3. Table 3 summarizes results from 5 separate probit estimations. In the first three estimations summarized In columns (1)-(3) the dependent variable is the subjective measure of vulnerability. The estimates in columns (1) differ from the estimates in the other columns because of the sample considered. In particular, the model is estimated on the full sample which include individuals who (own their homes, homeowners with mortgages, renter and those living without paying rent). In the remaining models summarized in Table 1 columns (2)-(5) we focus solely on renter and mortgage holder. Our rational for doing this is because this is the sub-sample for whom we can derive the objective measure of housing vulnerability.

For our model summarized in column (1) we control for work type given our interest in the relationship between work type and vulnerability. We also control for work type in the empirical model summarized in columns (2) and (4). The limitation of including work type is the restriction of the sample to only include individuals who are working. Given the benefit of also considering those who do not work in our analysis, we also estimate models were we drop the work type dummies and instead include a dummy for if an individual is employed or not. These models are summarized in columns (3) and (5). In the results summarized in column (2) we focus on those who rent and control for work type. In column (3) the work type controls are dropped and a dummy for employment is included. For the estimation models summarized in columns (4) and (5) the dependent variable is the objective measure. The model summarized in columns (4) includes a control for work type while the latter includes a control for employment.

The results in Table 3 highlights some findings that gives us insight as to what determined or is correlated with housing vulnerability during the pandemic. First, consistent across all models, the higher an individual's income the lower the probability of being housing vulnerable. We also find a non linear relationship between age and vulnerability. Age is positively correlated with housing vulnerability up to a certain threshold and negatively correlated with housing vulnerability above a certain age level. Across all models we find that education reduces housing vulnerability. We find some evidence of gender differences in housing vulnerability when we consider the subjective measure and focus solely on those who are employed. However this gender difference does not exist when we consider the larger sample summarized in column (3), and also when we use our objective measure [columns (4) and (5)].

Family size is another important correlate. In all models summarized in Table 3 we note a positive relationship between household size and housing vulnerability, and also between

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the number of people in the household below 18 and housing vulnerability. The larger the household size, the higher the probability that the individual is housing vulnerable. The results do not suggest much impact of marital status on housing vulnerability. In the models summarized in columns (1) (2) and (4) there is no difference in vulnerability between those who are never married, widowed or divorced/separated and the base group married. When we consider the larger sample [columns (3) and (5)]. However, we find some evidence that those who are divorced and separated are on average more vulnerable that those who are married.

Our results suggest that being employed reduces the probability of being housing vulnerable. The magnitude of the impact is stronger using the subjective measure versus the objective measure. In particular those who are employed are 6.8% less likely to be home vulnerable using the subjectively measure and 3.6% less likely using the objective measure.

Housing tenure matters. The results in columns (1) suggests that on average, mortgage holders are 73% more housing vulnerable than those who own their homes without a mortgage or live for free, while renters are 98% more vulnerable. This result is not surprising since those who own their homes without a mortgage are in no danger of losing it as long as they pay their taxes. The more interesting comparison is between renters and those who hold mortgages. The results in columns (2)-(4) suggest that even after controlling for income and other correlates that could affect housing vulnerability, renters are more vulnerable than those who hold mortgages. However this finding does not appear to be robust. When we focus on the full sample (employed or not) and use the objective measure, we do not find evidence that renters are more vulnerable. It is worth noting that when we focus on the full sample but use the subjective measure, renters have a 2.7% higher probability of being housing vulnerable compared to those with mortgages. What this difference may suggest is that compared to individuals with mortgages, renters may perceive themselves more vulnerable than they really are in terms of being able to pay their rent. Also as noted above this may be a refection of wealth differences for renters and mortgage holders.[14]

Our second question is focused on exploring potential heterogeneity in the evolution of vulnerability across race during the pandemic. To answer this question we adjust our previous model and include interaction terms between race and time. The results of this analysis using different controls is summarized in Table 4. Table 4 summarizes marginal effects from estimating 6 probit models. In columns (1), (3), (5) the dependent variable is the subjective measure whereas in columns (2), (4), (6) it is the objective measure. The models summarized in column (1) and (2) are based on estimating a base line mode with just ethnic dummies and interaction between these dummies and year. In columns (3) and

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[14]While we include a control for income in our analysis, we are unable to include wealth controls given the lack of such information in PUS.

(4) we focus solely on those who are employed and in columns (5) and (6) we focus on the full sample of employed or not employed. In columns (3) -(6) we include controls similar to those in Table 3.

Table 4 highlights some important trends. First, all the correlates of housing vulnerability summarized in Table 3 maintain their significance in the analysis shown in Table 4. More schooling, being employed and higher income reduce the probability of being housing vulnerable and household size and more household members below 18 increase the probability of being housing vulnerable.

Similar to Table 3, we note that Asian, Black, Hispanic and Mixed race are all more vulnerable than White on an average. However, including interaction terms allows us to see how this vulnerability changed during the pandemic compared to the White non Hispanic sub-group. Focusing on the objective measure and those employed, the result summarized in columns (4) suggests that after including relevant controls, there was no difference in housing vulnerability in 2020 between Whites the base group and either Hispanic or Mixed race. In contrast both employed Asian and Black were more vulnerable than Whites in 2020 (4.2% more vulnerable for Black and 3.4% more vulnerable for Asians. Interestingly, there was no increase in this vulnerability for employed Blacks compared to Whites in 2021. Hispanics also maintained similar vulnerability compared to Whites. In contrast there was a 5.3% increase in vulnerability for employed Asians compared to the gap with Whites in 2020. This is significant given these individuals are employed. When we look further at 2022 we find that there was a 4.5% increase in vulnerability compared to 2020 for Blacks and a 3.3% increase for Hispanics. For Asian there was a 4.0% increase in vulnerability in 2022 compared to the gap in 2020 with White. We can infer from these result that between 2020 and 2021 compared to Whites, the vulnerability of employed Asians increased but decreased slightly by 2022. In contrast, the vulnerability of employed Blacks did not increase between 2020 and 2021 compared to the White base group but increased by 2022. For employed Hispanics, vulnerability was similar in 2020 and 2021 compared to Whites but increased in 2022.

When we consider the full sample (employed and unemployed) using the objective measure summarized in column (6), we find a slightly different pattern. Even after controlling for the basic factors that affect housing vulnerability, Blacks were 5% more likely to be vulnerable than Whites in 2020, while Asians were 3.8% and Hispanic 2.1%. The change for Hispanic when we compared those who were employed to the full sample suggests that for Hispanic increased vulnerability above the White group is linked to those who are not employed. In terms of the evolution over time, the results in columns (6) suggests that Blacks vulnerability compared to Whites increased by 4% by 2021 and further increased by 2022.

Hispanics on the other hand, though they were on average more vulnerable than the White base group in 2022, exhibited no increase in the vulnerability in 2021 and 2022. For Asians we find an increase in the probability of being vulnerable of 7.7% , compared to Whites in 2021. This is the largest increase for any ethnic group in 2021. In 2022 this vulnerability decreased, returning the gap between Asians and Whites to 2020 levels.[15]

The results summarized above are based on the objective measure. If we consider the subjective measure, we note some important differences. First for those who are employed, the gap in the probability of being vulnerable compared to the White base group in 2020 is largest for Asians (13%). This gap is 8.5% for Black and 11% for Hispanic. When we consider the changes over 2021 and 2022, we note that for Blacks, there is no change in subjective housing vulnerability both in 2021 and 2022 compared to the gap in 2020. In contrast for Hispanic, this gap decreased by 3.2% in 2021 and 4.9% in 2022. Hence by 2022, the subjective vulnerability gap between Hispanic and Whites decreased compared to 2020. In contrast for Asian Americans, just like Blacks there was no increase in vulnerability compared to Whites in 2021. However, in comparison to Whites in 2020 vulnerability decreased by 5.7% in 2022. These results suggest that while employed Asians on an average did not feel as vulnerable in 2022 compared to 2020, in reality (objective measure) compared to employed whites, the probability they were vulnerable increased.

When we focus on the subjective measure for the full sample, we continue to note this contrast between respondents subjective evaluation of their vulnerability and the actual reality. The trend in the results are similar to those in columns (3) where we focus on those employed. In the full sample as in the sample of those employed, in 2020 Asians have the highest gap in the probability of being vulnerable compared to the White base group (14.1% more likely). For Hispanic they are 12.4% more likely and for Black 11%. These probabilities are all higher than the estimates for the employed sample which suggests that across race, those who are not employed are on average more housing vulnerable. In terms of the evolution of inequality using this subjective measure, for Blacks compared to Whites in 2020, we note no significant change in the housing vulnerability gap in 2021 and 2022. This is similar to the finding for the employed sample. For Hispanic we find similar trend as we noted among the employed. A decrease in the vulnerability gap between Whites and Hispanics in 2021 and 2022. (3.8% and 4.7% decrease respectively). Similar trend as was noted among employed Asians was noted for the full sample of Asians. No change in the probability of being vulnerable in 2021 compared to 2020 and a decrease of 6.4% in 2022.

The main findings from the results in Table 4 can be summarized as follows. First subjective measures of vulnerability in 2020 were higher than objective evaluation across race.

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[15]We do not discuss the results for the Mixed group since this group has a blend of difference races and ethnicity.

This could suggests people perceived themselves more vulnerable than they really were in 2020. Alternatively, it could suggest people were worried about the future since the subjective measure reflects perception about the immediate future (1-4 weeks). This perception could be linked with the significant uncertainty that was created with the exogenous nature of the pandemic, lack of clear information on the Corona virus especially in the early months of the pandemic and how to attenuate its spread, fear of job loss and the lock down government measures that was implemented during the early months of the pandemic. Another important take away from this table is that there is significant heterogeneity in the evolution of vulnerability across ethnicity over the years of the pandemic and these difference warrants further investigation. In particular there was a high increase in housing vulnerability for Asian between 2020 and 2021 when compared to Whites. Corroborating recent findings we highlighted above of a disproportionate increase in hardship faced by this group. We refer to this unexpected change as a "chilling effect".

The final question we address is focused on if there is heterogeneity across renters and mortgage holders in the determinants of housing vulnerability. Considering renters and mortgage holders separately is useful given the difference in policies and programs that were available to renters and homeowners with mortgages during the pandemic. Moreover, since we do not have controls for wealth and owning a home is a significant source of wealth, considering both groups separately is useful. In addition, given our interest in overall well being and the difference between individuals' subjective evaluation of vulnerability and the objective measure, we explore the correlation of worry with housing vulnerability.

The uncertainty that characterized the pandemic has been documented to have had significant effects on wellness and mental health. Individuals' perception of their vulnerability could be affected by how much they are worrying. There could be many pathways that could have led to significant worrying during the pandemic including the possibility of catching the virus, losing a job and the possibility of not being able to pay rent or mortgage. In the data, the variable worry is coded as a rank variable from 1 not worrying at all to 4 worrying almost everyday. We create a dummy variable from this rank variable. The dummy variable takes the value of 1 if an individual has spent time worrying and 0 if the response to the question was not worried at all.

To explore differences between renters and mortgage holders, we estimate our models separately for renters and mortgage holders. The marginal effects from these estimations are summarized in Tables 5 and 6. In Table 5 we present the marginal effects results using the subjective measure and in Table 6 we present the results using the objective measure of vulnerability. For the analysis summarized in Tables 5 and 6 we focus on the full sample and include a control for employment. We do not present separate analysis for employed

solely. In columns (1) and (2) of Table 5 and 6, we do not include interaction terms between ethnicity and time and in the models summarized in columns (3) and (4) we do. The models summarized in columns (3) and (4) allow us track the evolution of vulnerability across renters and mortgage holders separately from 2020-2022.

The main findings from Tables 5 and 6 are as follows. First the magnitude of the correlates between variables such as income, age, education, household size, employment, worry, and vulnerability (objective or subjective) are consistently larger for renters than mortgage holders. For example from Table 5, a 1% increase in income for renters decreases the probability of being vulnerable by 10.7% while for mortgage holders this decrease is only 6.3%. If we focus on the objective measure in Table 6, a 1% increase in income for renters decreases the probability of being vulnerable by 6.8% while for mortgage holders this decrease is only 3.4%. In addition, across race, the gap in housing vulnerability compared to the base group White is larger for renters compared to mortgage holders.

The significance of worry is another relevant finding from this analysis. Not surprisingly, those who worry are on average more housing vulnerable than those who don't. We also note differences in this relationship for renters and mortgage holders. For example from Table 4 columns (1) and (2), renters who worry have a 17% higher probability of being housing vulnerable while mortgage holders who worry have a 10% high probability of being vulnerable. Table 5 which is focused on the objective measure also - highlights differences. In columns (1) and (2) renters who worry have a 7.6% higher probability of being housing vulnerable compared to those who don't, while mortgage holders who worry have just a 5% higher probability of being vulnerable. This result suggests that even after controlling for relevant factors that affect vulnerability, there is still a stronger correlation between housing vulnerability and worry for renters than mortgage holders.

With respect to the evolution of vulnerability over the pandemic, we find significant heterogeneity across both race and housing tenure. In particular, if we focus on the subjective measure summarized in Table 5, columns (3) and (4), we note that in 2020 Black renters have a 14.6% higher probability of being housing vulnerable compared to Whites. For Hispanics this number was 14.4%. Asian renters had the biggest gap in 2020. They had a 17.3% higher probability of being housing vulnerable compared to Whites. When we focus on mortgage holders the gap between each of these groups and the White base group are smaller and similar (9.5% Blacks, 9.2% Hispanic and 9.2% Asian).

The results in Table 4 suggested increase in vulnerability in 2021 and 2022 for other racial groups compared to Whites. Our results in Table 5 and 6 suggest that this increase in vulnerability is more so a renters issue. From the results summarized in column (4) Table 5, we can infer that Asian and Black mortgage holders did not experience an increase in

the subjective measure of vulnerability in 2021 and 2022 compared to 2020. In contrast Hispanics who hold mortgages experienced a decrease in the subjective measure in 2021. When we focus on renters we note that Black renters also did not experience a change in 2021 and 2022 over the gap with Whites in 2020. Hispanics and Asian renters on the other hand in 2022, experienced a decrease in the subjective housing vulnerability gap compared to Whites (5.5% and 7.5%).

When we focus on the results from the models using the objective vulnerability measure summarized in columns (1) and (2), we find on average over the period, Black renters have the greatest vulnerability gap compared to White renters (11.5%). The second highest group is Asians. The gap for Asians of 7.1% comes as a surprise given Asians are generally viewed as the more affluent minority with high income and education levels. Hispanics on the other hand had the smallest gap in housing vulnerability compared to Whites (3.5%). When we focus on mortgage holders, we again see this unexpected result for Asians. On an average over the pandemic, Asians have the widest gap compared to Whites (6.4%). Blacks are 6.2% more vulnerable and Hispanic are 1.4% more vulnerable, compared to Whites.

When we examine the evolution overtime using the objective measure summarized in columns (3) and (4) and include relevant controls, we note no differences in vulnerability for Hispanic renters compared to White renters over the period. This result is surprising and warrants further investigation. For Black renters, we note they were 6.2% more vulnerable than White renters in 2020 and this vulnerability increased significantly by 9.5% points in 2021 and decreased slightly by 2022 reducing the increase in vulnerability between 2020 and 2022 to 8%. For Asian renters we note no gap compared to Whites in 2020 but a significant increase of 20% by 2021. This vulnerability gap decreased in 2022 but the increase in the gap for Asian renters compared to 2020 levels is still significant at 13.1% . In both 2021 and 2022 compared to 2020, Asian renters had the highest increase in vulnerability. This somewhat *chilling effect* is beginning to be highlighted in the literature and warrants more rigorous investigation.[16]. When we focus on mortgage holders. We note that Blacks are 5.5% more likely to be home vulnerable than Whites in 2020 but there is no increase in this vulnerability in 2021 or 2022. Similarly, Hispanic mortgage holders have a 1.6% higher probability than Whites of being vulnerable in 2020 but this vulnerability compared to Whites does not increase in either 2021 or 2022. For Asians with mortgages again we note an increase in vulnerability. Asian mortgage holders had a 4.2% higher probability of being housing vulnerable in 2020 and this gap increases by 4.9% points in 2021. In 2022, we do not note any significant increase compared to 2020 for Asians.

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[16]https://latino.ucla.edu/research/renter-insecurity-Covid-19/; https://www.mckinsey.com/industries/public-and-social-sector/our-insights/covid-19-and-advancing-asian-american-recovery

6 Summary, Conclusion and Further Work

In this paper, we use Pulse Survey data from April 2020, April 2021 and April 2022 to examine housing vulnerability over the pandemic. We analyze housing vulnerability using both a subjective and an objective measure. The first consistent trend we noted regardless of the group we considered was that subjective measures of vulnerability in 2020 were higher than objective evaluation. When we consider determinants of housing vulnerability, we find that being employed, higher income and higher years of schooling significantly lowers housing vulnerability. We also note significant heterogeneity across race in housing vulnerability and the evolution of this vulnerability. In particular, we find that between 2020 and 2021 there was a high increase in housing vulnerability using the objective measure for Asians when compared to Whites. In contrast, Hispanics did not experience an increase during this period. Blacks also experienced an increase but the magnitude of the increase for Asians was higher. With the government and state level pandemic relief in place and with economic recovery of jobs and income from 2021 onward, we find that in the average housing vulnerability decreased in 2022 compared to 2021. However, difference were noted across groups. For example compared to Whites, the probability of being vulnerable was still higher in 2022 than 2020 levels for Asians and vulnerability increased for Blacks in 2022 compared to 2021. Hispanics on the other hand faced no increase in vulnerability- compared to Whites. This analysis shows that renters over mortgage holders were more vulnerable across all ethnic groups and we further find a stronger correlation between worry and housing vulnerability for renters than mortgage holders. Asian mortgage holders as well as renters possibly faced a chilling effect through the pandemic and could not avail the relief programs in place effectively.

During the pandemic between 2020 and 2021, the government passed several legislation including several programs aimed at combating the economic effects of the pandemic on individuals and families. Some of the programs initiated were focused on reducing housing insecurity, and providing relief to home owners and renters.[17] There is anecdotal evidence that there was significant heterogeneity across group in who was able to gain information on these programs, eligibility and how to successfully gain access these programs successfully. Herd and Moynihan (2019) highlight the multifaceted nature of costs when trying to access benefits. Costs include learning costs, compliance cost and psychological costs. Heterogeneity across ethnicity for these costs could lead to differences in access to relief programs during 2020 to 2021. This could be a pathway in explaining the differences in the evolution of vulnerability across ethnicity, noted in the tables above especially the chilling effect noted

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[17]For example, $12 billion was provided to fund housing programs. In addition, the CARES Act provided additional protections with the eviction moratoriums and homeowners option to suspend mortgage payment.

for Asians who are typically not viewed as a disadvantaged minority group.

To gain a better understanding of why Asian experienced increase in vulnerability especially for renters, our next steps include a closer analysis of Asian Americans and the challenges this group faced in accessing government relief programs between 2020 and 2021. Did the "costs" they faced for access differ significantly compared to other groups? We also plan to explore the impact of government programs aimed at creating mortgage and rent relief between 2020 and 2021 on housing vulnerability, and potential differences across race and across states.

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Table 3: Housing Vulnerability- Correlates/Determinants(Marginal Effects)

Variable	ALL Subjective (1)	Subjective (2)	Subjective (3)	Objective (4)	Objective (5)
		Renter and Mortgage Holders Only			
Income Proxy	-0.013***	-0.077***	-0.093***	-0.043***	-0.051***
	(0.001)	(0.004)	(0.004)	(0.003)	(0.003)
Age	0.001***	0.006***	0.012***	0.007***	0.010***
	(0.000)	(0.002)	(0.002)	(0.001)	(0.001)
Age^2	-0.000**	-0.000**	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Yrs School	-0.003***	-0.015***	-0.018***	-0.007***	-0.007***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Male	-0.002**	-0.014**	0.003	-0.002	0.004
	(0.001)	(0.005)	(0.005)	(0.004)	(0.004)
HH Size	0.001***	0.008***	0.009***	0.008***	0.008***
	(0.000)	(0.003)	(0.002)	(0.002)	(0.002)
No. in HH< 18	0.002***	0.010***	0.010***	0.004	0.004
	(0.001)	(0.004)	(0.003)	(0.003)	(0.002)
Black Non Hispanic	0.018***	0.092***	0.104***	0.066***	0.081***
	(0.004)	(0.012)	(0.010)	(0.010)	(0.009)
Hispanic	0.014***	0.073***	0.090***	0.026***	0.024***
	(0.003)	(0.011)	(0.010)	(0.008)	(0.007)
Asian	0.019***	0.094***	0.113***	0.069***	0.070***
	(0.004)	(0.015)	(0.014)	(0.012)	(0.011)
Mixed	0.008***	0.042***	0.066***	0.029***	0.041***
	(0.003)	(0.015)	(0.014)	(0.012)	(0.011)
Mortgage Holder	0.726***				
	(0.038)				
Renting	0.976***				
	(0.010)				
Rent		0.024***	0.027***	0.010**	0.005
		(0.007)	(0.006)	(0.005)	(0.004)
Year 2021	-0.006***	-0.040***	-0.044***	-0.016***	-0.019***
	(0.001)	(0.006)	(0.005)	(0.004)	(0.004)
Year 2022	-0.006***	-0.035***	-0.041***	-0.021***	-0.030***
	(0.001)	(0.006)	(0.006)	(0.004)	(0.004)
Private Company	0.000	0.002		0.009*	
	(0.001)	(0.008)		(0.005)	
Tax Exempt Organizations	0.000	0.001		0.008	
	(0.002)	(0.010)		(0.008)	
Self-employed/family business	0.006***	0.037***		0.041***	
	(0.003)	(0.012)		(0.010)	
Employed			-0.068***		-0.036***
			(0.007)		(0.004)
Widowed	-0.002	-0.014	0.001	0.010	0.016
	(0.003)	(0.018)	(0.015)	(0.014)	(0.012)
Divorce/Separated	0.001	0.007	0.020***	0.005	0.017***
	(0.001)	(0.008)	(0.008)	(0.007)	(0.006)
Never Married	-0.001	-0.004	-0.007	0.003	0.005
	(0.001)	(0.008)	(0.007)	(0.006)	(0.005)
N	98866	80575	125032	80510	124865

Note: In addition to the variables in the table above we also control for state fixed effects. Marginal effects are reported above and standard errors of these effects are in parenthesis. Detail results can be requested. Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Housing Vulnerability- Time Differences Across Race (marginal effects))

Variable	Subjective (1)	Objective (2)	Subjective (3)	Objective (4)	Subjective (5)	Objective (6)
Black Non-Hispanic	0.231***	0.134***	0.085***	0.042***	0.110***	0.050***
	(0.015)	(0.013)	(0.017)	(0.012)	(0.015)	(0.010)
Hispanic	0.236***	0.083***	0.110***	0.013	0.124***	0.021**
	(0.017)	(0.013)	(0.019)	(0.011)	(0.016)	(0.009)
Asian	0.117***	0.042***	0.130***	0.034**	0.141***	0.038***
	(0.021)	(0.017)	(0.025)	(0.017)	(0.022)	(0.015)
Mixed	0.127***	0.065***	0.025	0.022	0.063***	0.028**
	(0.023)	(0.019)	(0.024)	(0.018)	(0.022)	(0.016)
Year 2021	-0.052***	-0.040***	-0.036***	-0.023***	-0.035***	-0.027***
	(0.007)	(0.005)	(0.007)	(0.005)	(0.006)	(0.004)
Year 2022	-0.037***	-0.048***	-0.021***	-0.034***	-0.025***	-0.041***
	(0.007)	(0.005)	(0.007)	(0.005)	(0.007)	(0.005)
BlackX2021	-0.019	0.033**	0.018	0.021	-0.006	0.040***
	(0.017)	(0.017)	(0.022)	(0.016)	(0.017)	(0.017)
BlackX2022	-0.024	0.037**	0.003	0.045**	-0.011	0.050***
	(0.017)	(0.018)	(0.019)	(0.021)	(0.017)	(0.018)
HispanicX2021	-0.034**	0.010	-0.032*	0.011	-0.038**	-0.005
	(0.016)	(0.016)	(0.015)	(0.016)	(0.015)	(0.012)
HispanicX2022	-0.039**	0.017	-0.049***	0.033*	-0.047***	0.015
	(0.017)	(0.017)	(0.015)	(0.020)	(0.016)	(0.015)
AsianX2021	-0.009	0.070***	-0.006	0.053***	0.003	0.077***
	(0.023)	(0.026)	(0.022)	(0.025)	(0.023)	(0.025)
AsianX2022	-0.053**	0.019	-0.057***	0.040*	-0.064***	0.021
	(0.021)	(0.022)	(0.015)	(0.025)	(0.017)	(0.020)
MixedX2021	0.015	0.016	0.035	0.003	-0.000	0.012
	(0.029)	(0.021)	(0.035)	(0.022)	(0.025)	(0.020)
MixedX2022	0.015	0.035	0.023	0.015	0.010	0.029
	(0.029)	(0.026)	(0.032)	(0.025)	(0.027)	(0.024)
Income Proxy			-0.077***	-0.043***	-0.093***	-0.051***
			(0.004)	(0.003)	(0.004)	(0.003)
Age			0.006***	0.007***	0.012***	0.010***
			(0.002)	(0.001)	(0.002)	(0.001)
Age^2			-0.000***	-0.000***	-0.000***	-0.000***
			(0.000)	(0.000)	(0.000)	(0.000)
Yrs School			-0.015***	-0.007***	-0.018***	-0.007***
			(0.001)	(0.001)	(0.001)	(0.001)
Male			-0.013**	-0.002	0.003	0.004
			(0.005)	(0.004)	(0.005)	(0.004)
HH Size			0.008***	0.008***	0.009***	0.008***
			(0.003)	(0.002)	(0.002)	(0.002)
No. in HH< 18			0.010***	0.004	0.010***	0.004
			(0.004)	(0.003)	(0.003)	(0.002)
Rent			0.024***	0.010**	0.027***	0.005
			(0.007)	(0.005)	(0.006)	(0.004)
Self-employed/family business			0.036***	0.041***		
			(0.012)	(0.010)		
Employed					-0.068***	-0.035***
					(0.007)	(0.004)
N	131001	130584	80575	80510	125032	124865

Note:In addition to the variables in the table above we also control for State fixed effects, dummies for marital status, dummies for private company, tax exempt organizations (base group government) in column (3) and (4). Marginal effects are reported above and standard errors of these effects are in parenthesis. Detail results can be requested.

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Housing Vulnerability Subjective Measure- Renter vs Mortgage Holder

Variable	Panel A		Panel B	
	Renter	Mortgage	Renter	Mortgage
	(1)	(2)	(3)	(4)
Income Proxy	-0.107***	-0.063***	-0.108***	-0.064***
	(0.009)	(0.004)	(0.009)	(0.004)
Age	0.020***	0.005***	0.020***	0.005***
	(0.002)	(0.002)	(0.002)	(0.002)
Age^2	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Yrs Sch	-0.025***	-0.013***	-0.024***	-0.013***
	(0.003)	(0.001)	(0.003)	(0.001)
Male	0.014	0.021***	0.013	0.020***
	(0.010)	(0.005)	(0.010)	(0.005)
HH size	0.004	0.009***	0.003	0.009***
	(0.004)	(0.003)	(0.004)	(0.003)
No. in HH< 18	0.024***	0.007**	0.024***	0.007*
	(0.006)	(0.004)	(0.006)	(0.004)
Worry	0.178***	0.104***	0.177***	0.101***
	(0.009)	(0.005)	(0.009)	(0.005)
Black Non Hispanic	0.137***	0.092***	0.146***	0.095***
	(0.016)	(0.013)	(0.022)	(0.022)
Hispanic	0.111***	0.072***	0.144***	0.096***
	(0.016)	(0.011)	(0.024)	(0.018)
Asian	0.149***	0.086***	0.173***	0.092***
	(0.026)	(0.014)	(0.040)	(0.021)
Mixed	0.093***	0.043***	0.060*	0.063***
	(0.023)	(0.016)	(0.033)	(0.028)
Employed	-0.093***	-0.041***	-0.091***	-0.037***
	(0.011)	(0.007)	(0.011)	(0.007)
Year 2021			-0.036**	-0.026***
			(0.014)	(0.006)
Year 2022			-0.006	-0.033***
			(0.015)	(0.006)
BlackX2021			0.001	-0.012
			(0.033)	(0.018)
BlackX2022			-0.029	0.003
			(0.029)	(0.022)
HispanicX2021			-0.038	-0.028*
			(0.028)	(0.014)
HispanicX2022			-0.055*	-0.030
			(0.029)	(0.018)
AsianX2021			0.009	0.017
			(0.051)	(0.022)
AsianX2022			-0.075*	-0.028
			(0.040)	(0.017)
MixedX2021			0.047	-0.024
			(0.049)	(0.022)
MixedX2022			0.061	-0.022
			(0.052)	(0.024)
N	41552	83248	41552	83248

Note: In addition to the variables in the table above we also control for state fixed effects, dummies for marital status. Marginal effects are reported and standard errors of these effects are in parenthesis. Detail results can be requested.
Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Housing Vulnerability Objective Measure- Renter vs Mortgage Holder

	Panel A		Panel B	
Variable	Renter	Owner	Renter	Owner
	(1)	(2)	(3)	(4)
Income Proxy	-0.068***	-0.034***	-0.069***	-0.035***
	(0.006)	(0.003)	(0.006)	(0.003)
Age	0.014***	0.006***	0.014***	0.006***
	(0.002)	(0.001)	(0.002)	(0.001)
Age^2	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Yrs School	-0.010***	-0.006***	-0.010***	-0.005***
	(0.002)	(0.001)	(0.002)	(0.001)
Male	0.021***	0.006*	0.021***	0.006
	(0.008)	(0.004)	(0.008)	(0.004)
HH size	0.007**	0.008***	0.008**	0.007***
	(0.003)	(0.002)	(0.003)	(0.002)
$\#ofkids < 18$	0.012**	0.001	0.011**	0.001
	(0.005)	(0.003)	(0.005)	(0.003)
Employed	-0.042***	-0.028***	-0.039***	-0.023***
	(0.009)	(0.005)	(0.009)	(0.005)
Worry	0.076***	0.050***	0.076***	0.049***
	(0.008)	(0.004)	(0.008)	(0.004)
Black Non-Hispanic	0.115***	0.062***	0.062***	0.055***
	(0.015)	(0.011)	(0.016)	(0.016)
Hispanic	0.035***	0.014**	0.025	0.016*
	(0.012)	(0.007)	(0.016)	(0.010)
Asian	0.071***	0.064***	-0.010	0.042***
	(0.022)	(0.011)	(0.025)	(0.015)
Mixed	0.066***	0.023**	0.038*	0.019
	(0.019)	(0.012)	(0.024)	(0.018)
Year 2021			-0.037***	-0.020***
			(0.010)	(0.004)
Year 2022			-0.041***	-0.039***
			(0.010)	(0.004)
BlackX2021			0.095***	-0.002
			(0.033)	(0.014)
BlackX2022			0.080***	0.019
			(0.031)	(0.021)
HispanicX2021			0.005	-0.008
			(0.023)	(0.012)
HispanicX2022			0.032	0.002
			(0.029)	(0.016)
AsianX2021			0.201***	0.049***
			(0.067)	(0.022)
AsianX2022			0.131***	0.014
			(0.058)	(0.019)
MixedX2021			0.029	0.003
			(0.037)	(0.021)
MixedX2022			0.058	0.012
			(0.043)	(0.025)
N	41496	83139	41496	83139

Note: In addition to the variables in the table above we also control for state fixed effects, dummies for marital status. Marginal effects are reported and standard errors of these effects are in parenthesis. Detail results can be requested.
Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$