In Need of a Roof: Pandemic and Housing Vulnerability

Kusum Mundra*and Ruth Uwaifo Oyelere†

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Abstract

Housing is a basic need and is intricately connected to a household's health and wellness. The COVID-19 pandemic exposed the housing vulnerability for certain subgroups of the population and further jeopardized these household's health and stability. Using the Household Pulse Survey (HPS) launched by the U.S. Census Bureau in April 2020, we examine the correlates of housing vulnerability during the pandemic. We explore heterogeneity in the evolution of housing vulnerability during the pandemic along demographic characteristics such as ethnicity and housing type (renter vs owner) and find that Asians experienced a unique increase in housing vulnerability, more than Hispanics and Blacks, particularly for Asian renters between 2020-2021. This possibly shows a *chilling effect* for Asians during the pandemic (2000-2022). We also note that not being employed, larger house hold size, lower levels of education and income are positively correlated with housing vulnerability. We also find that households who indicate they worried in the last two weeks are significantly more housing vulnerable and worrying is more acute for renters.

JEL classification: R2; R3; J10; I31

Keywords: Renter, Homeowner, Housing vulnerability, Pandemic, Ethnicity, Asian

*kmundra@newark.rutgers.edu, Department of Economics, Rutgers University, Institute for the Study of Labor (IZA), Bonn Germany and Global Labor Organization (GLO)

†ruwaifo@agnesscott.edu, Department of Economics, Agnes Scott College, 41 E College Ave, Decatur, GA 30030; Institute for the Study of Labor (IZA), Bonn Germany and Global Labor Organization (GLO)

1 Introduction

The COVID-19 pandemic left many households jobless, faced with tremendous anxiety and mental trauma, and acutely exposed to eviction and foreclosure. The Congressional Research Service (CRS) indicates that 65 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(CFB)).[1] Recent reports using survey data from the Census Bureau show 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 renters as well as homeowners with mortgages.

In the U.S., even before the onset of the pandemic in February-March 2020, it is well known that Blacks and Latinx face income, wealth and housing gaps and also lack safety nets in the face of exogenous shocks and crisis.[2] These gaps were further exacerbated with the onset of the COVID-19 pandemic and the lock-downs that followed. Some recent papers have noted that Blacks and Latinx were more significantly affected because they worked more in sectors and occupations that were more severely affected by the crisis (See Vargas & Sanchez 2020). For example, 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 who were hardest hit with job losses, also faced longer delays in getting re-employed (Cheng et al. 2020).[3] These challenges in the labor market can lead to negative spill over effects in housing, leading to an increase in foreclosures and evictions. In this paper we focus on one specific housing challenge created and exacerbated by the pandemic- falling behind in mortgages or rent payments. We refer to those experiencing this challenge as housing vulnerable.

We explore three main questions in our paper related to the aforementioned challenge. First, What are the determinants and correlates of housing vulnerability during the 2020-2022 pandemic? Second, we examine if housing vulnerability changed over the pandemic years (2020-2021-2022), and if there are differences across ethnic groups. It is important to

[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 insecurities, there was increasing health and food crisis. COVID Hardship Watch from the Center on Budget and Policy documented 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.

consider how housing vulnerability changed across these groups over time given the preexisting housing inequality across ethnicity, and recent findings that suggest that minorities, including Asians, were more adversely affected in the labor market during the pandemic (Gover et al., 2020, Kim et al., 2021). Third, 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 is correlated with our dependent variable housing vulnerability, and how this differs across homeowners and renters.[4]

To address these questions we make use of data from the Household Pulse Survey (HPS) initiated at the start of the pandemic by the Census Bureau and define an individual as housing vulnerable if they are facing hardships in paying their mortgage or rent and are falling behind in these payments. While we acknowledge that there are alternative ways housing vulnerability can be defined, for the purpose of this paper, our definition is restricted to those who are behind in their mortgages or rent payments. Falling behind in these payments puts these individuals in danger of being evicted (renters) or foreclosed on (mortgage holders).

The richness of the Pulse Survey data enables researchers to construct both subjective and objective measures of housing vulnerability. In this paper we focus on the objective measure.[5] In particular we use responses to the question as to whether home mortgage holders and renters are caught up in their mortgages and rent payments, respectively. Our basic methodology to examine our questions of interest is a standard probit model with fixed effects.

Our results suggest that being employed, having higher 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. 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 in the aforementioned gap during this period. Blacks also experienced an increase from 2020-2021 in the vulnerability gap compared to Whites but the increase was less than the increase for Asians. When we consider renters and mortgage holders separately, we still

[4]The survey we use for this analysis includes questions that capture respondents' self-reported levels of worrying and other self-reported measures of well-being including anxiety. We focus on just worry because of its strong correlation with anxiety which could leads to issues of multicollinearity if both are included in the same regression. In addition, our exploration of the correlation between worry and our dependent variable is purely descriptive and we are not suggesting that worrying causes housing vulnerability.

[5]We explore both an objective and subjective measure of housing vulnerability in the working paper version of this paper.

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 20.2% increase. Given Asian and White renters faced similar housing vulnerability at start of the pandemic, the marked increase in vulnerability for them by May 2021 suggests that Asian 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 housing vulnerability faced by Asian Americans during the pandemic years.

The rest of our paper proceeds as follows. Section 2 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 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, Karpman et al. 2020, Chun et al. 2022). Using Socioeconomic Impacts of COVID-19 Survey (SEICS) with five longitudinal survey waves administered during April 2020 and June 2021 Chun et al (2022) consider the role of assets and income on short term fluctuations in housing instability. While we acknowledge the dynamics in the housing market during this period, we do not think that looking at pandemic specific periods would be consistent with our question and focus of our paper. 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. We compare housing vulnerability at the outset of COVID (April 2020), to the post CARES Act and CDC moratorium (April 2021), and further to the one year after these policies have been in effect (April 2022).

The lockdown 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 (Malpezzi 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 on 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.[6] In addition to these two relief efforts for homeowners and renters at the federal level, different states passed their own relief programs at various points in time during the pandemic.[7]

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, particularly Asians and immigrants,

[6]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.

[7]According to McCarty et al. (2020), *"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)

were unable to effectively access and benefit from these programs. This lack of access by certain groups could possibly explain the *chilling effect* on Asian noted in our analysis.

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 were examined. The report show that there were significant barriers in accessing the safety net programs, particularly the rental moratorium in California. Language barriers and immigration status were noted as the primary reasons for the bottle necks in access.[8] Gover (2020) corroborates this report. He notes that 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.

It is important to highlight that recent evidence suggests that in general, Asians who are sometimes viewed as a "model minority", and immigrants groups, faced disproportionate economic hardships during the pandemic. This differential impact has been attributed to the fact that many were involved in small businesses that were adversely affected by the pandemic.[9] 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. This analysis will shed more light on this potential heterogeneity in impact.

Our subsidiary question exploring overall well-being and housing by examining the correlation between worry and housing vulnerability during the pandemic is also important to consider given the unprecedented scale of devastation and global impact of COVID-19. In particular, the lockdown measures, social distancing, high death toll, severe economic contraction, and financial hardships leading to food, housing and health hardships. There is a

[8]This report for California was in conjunction with 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. Additionally, 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/. Also see Ong and Pech (2023). These finding could be an explanation for the disproportionate increase in housing vulnerability for Asians we noted.

[9]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*

well established and long-standing literature providing evidence of the link between housing and health/well-being (see Reeves et al, 2016 and Clair and Hughes, 2019). Moreover, 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 that reflect a decline in overall well-being 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, making them more vulnerable through and after the pandemic (Gover et al., 2020; Kim et al. 2021). We are able to capture worry in our paper leveraging a question from the HPS that allows respondents to self-report how worried they are.

3 Data and Descriptive Statistics

As noted above, to explore our questions of interest, we make use of the US Census Bureau's Household Pulse Survey (HPS). Hps 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.[10]

To derive the sample of respondents, 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

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

the pandemic on individuals, households and communities.

For our research, we derive weekly microdata files 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. Our choice of these three weeks of PUF is intentional. We want to capture a beginning period where policy impact would be limited, a second period where policy impact would be more effectively diffused and the last period post these federal programs. Moreover, using these weeks allows us to capture individuals' responses from the beginning/ early months of the pandemic, a year later and two years later.[11]

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 in our analysis. We view an individual as housing vulnerable if they have not paid their rent when due and hence could be in danger of getting evicted or if they have not paid their mortgage when due and hence could be in danger of losing their home through foreclosure. In particular, we construct our dependent variable 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.

Table 1: Percent Housing Vulnerable (2020-2022: Race, Education, Sector

Panel A	White non-Hispanic	Black-non-Hispanic	Hispanic	Asian non-Hispanic	Mixed/Other
Mortgage	4.91	13.47	10.36	11.24	9.36
Rent	8.76	23.44	16.37	13.48	16.39
Panel B	High School	Some College	Associate	Bachelor	Graduate
Mortgage	11.04	8.63	7.83	4.75	3.93
Renter	18.82	15.1	14.77	7.76	6.24
Panel C	Government	Private	Non-profit	Self-employed	Work for Family Business
Mortgage	4.19	5.3	3.98	7	6.81
Rent	7.63	10.05	6.65	13.43	12.07

Table 1 provides a summary of the share of people who are housing vulnerable across certain demographic groups, combining our three survey periods. We present this summary

[11]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.

of housing vulnerability separately for those paying rent and those with mortgages. The demographic breakdowns we consider in Table 1 are ethnicity, education and work type. Our ethnicity break down consist of White non-Hispanic, Black non-Hispanic, Hispanic, Asian and Other/Mixed category. The other /Mixed category includes Native Americans and individuals who identify themselves as having mixed race. Table 1 highlights a few general trends. First, it shows that the housing vulnerable share is on average higher for renters than mortgage holders. For example, in Panel A, 10.36% of Hispanic mortgage holders are vulnerable in contrast to 16.37% of Hispanic renters. If we also look across education level in Panel B, 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 also, 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. [12]

The second main finding from this table is useful for policy targeting. Across 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, 23.44% of Black non-Hispanic renters are housing vulnerable in contrast only 8.76% of Whites non-Hispanic renters are housing vulnerable. Another group with high levels of vulnerability are Hispanics (16.37% of renters). 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: 18.82% and mortgage holders: 11.04%). Those with graduate degrees, not surprisingly, have the lowest share of housing vulnerability (renter: 3.93% and mortgage holders: 6.24%). When we look across work types, we note more housing vulnerability for those who are self-employed or work for a family business compared to those who work for the government or private sector. For example, among mortgage holders who are self-employed 7% are vulnerable in contrast to 4.19% for government workers, and 3.98 % for those who work for tax exempt organizations.

Given our interest in how home vulnerability evolved over the pandemic, we summarize changes in housing vulnerability across time using Figures 1-4. Figure 1 summarizes changes over time (2020-2022) across race. We note that home vulnerability was highest in 2020 across race and declined on average in 2021. It is worth noting that there was a decline for all sub-groups except Asian in 2021. For Asians there was an increase in the share vulnerable from 10.2% in 2020 to 14.9%. Between 2021 and 2022 home vulnerability continued to decline for all racial groups and also declined significantly for Asians.

[12] In our econometric analysis we control for socioeconomic factors and verify if these gaps in the share of who are vulnerable persists between renters and mortgage holders.

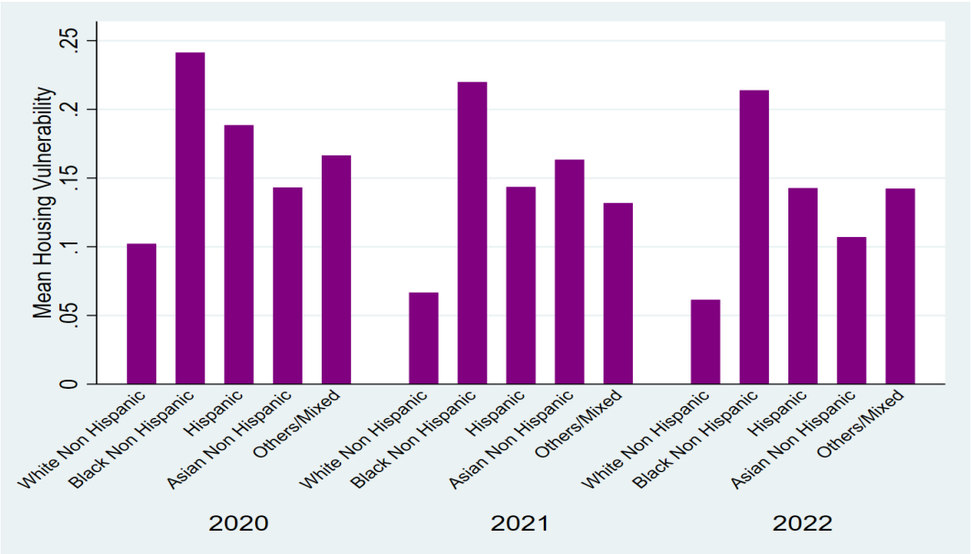

Figure 1: Home Vulnerability over the Pandemic by Race

In Figure 2 we capture housing vulnerability trends across education attainment levels.[13] Notice that just like with Figures 1, vulnerability declined 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 percentage points). Next highest decline in vulnerability is for the high school group with less experience (4 percentage points), followed closely by those with an associate degree.

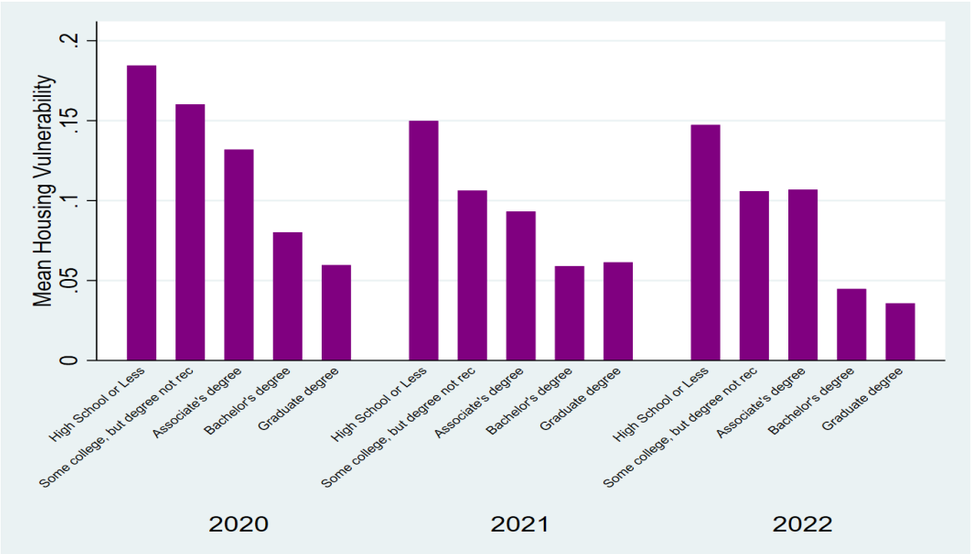

Figure 2: Home Vulnerability by Education Level 2020-2022

In Figure 3 we explore the heterogeneity across employment broad categories for mortgage holders and renters overtime. We divide individuals into three groups. Those who are retired or unemployed, those who work for someone else (other employed) and finally those who are self-employed or work for a family business. Similar to Table 1, we note renters are more

[13]Going forward for brevity, we will sometimes refer to housing vulnerability simply as vulnerability.

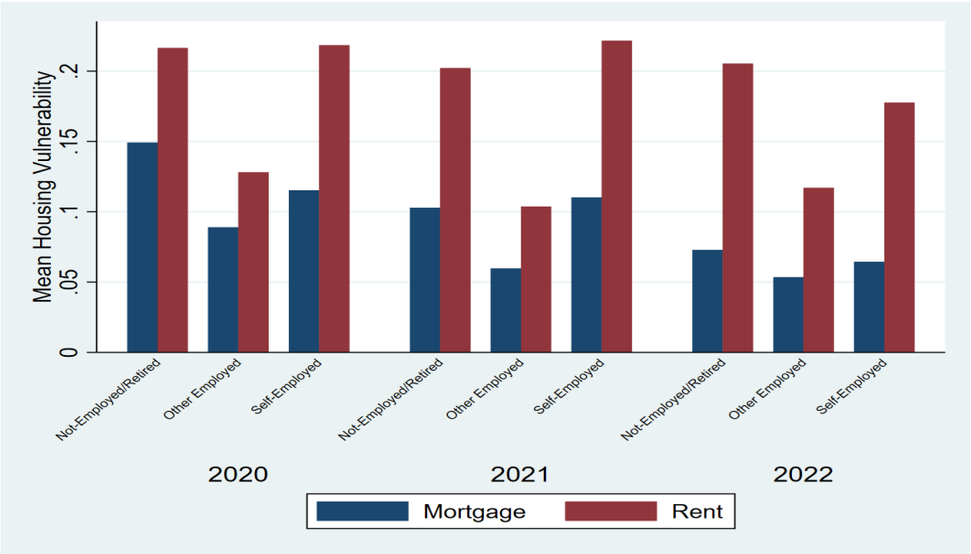

Figure 3: Home Vulnerability by Employment Status Categories- Renter vs Mortgage Holders

vulnerable than mortgage holders in each group. Also, those who are not employed or retired are more vulnerable than those who are employed (self employed or other employment). For most groupings, the share of household vulnerable was highest in 2020 and declined at different rates up until 2022. The only exceptions to this consistent decline was the slight increase between 2021 and 2022 in the share of "other employed" and not employed/retired renters who are vulnerable.

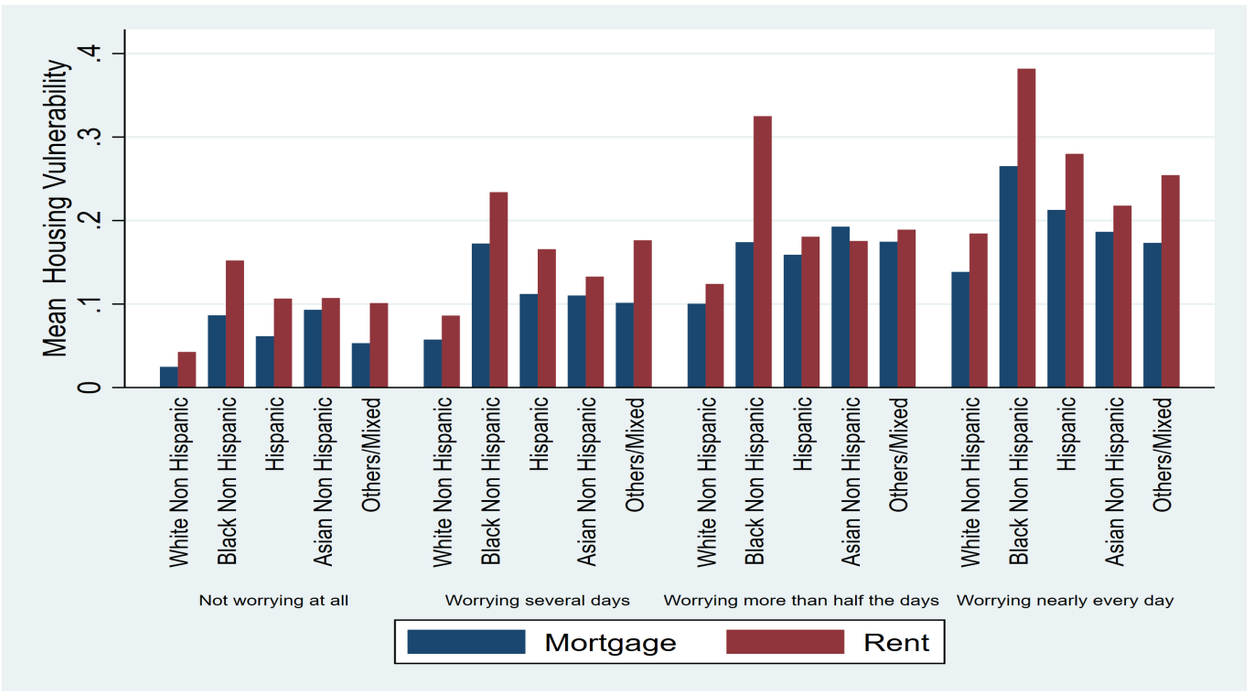

Figure 4: Home Vulnerability, Worry and Ethnicity

In Figure 4 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 (Brosschot and Thayer (2004) and

Watkins, 2008), presenting this subjective measure has value. Figure 4 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. This observation could suggest a closer link between housing vulnerability and worrying for Blacks and Hispanic but more research beyond the scope of our paper is needed to confirm this.

4 Empirical Framework

To examine the correlates of housing 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 takes the value of 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. In all cases, we assume a probit model and present the marginal effects. For example, in some estimations of the model we focus solely on those who rent while in others, we focus on the sample of those who have a mortgage. In addition, while we vary certain variables depending on the question we are exploring, for most our analysis, our vector X includes age, Age^2, estimate of years of schooling, dummies for ethnicity, dummy for worry, household size, dummies for marital status, dummies for work type, gender, the number of household members below 18, and dummies for income categories based on prior years annual income. We also include year fixed effects (ψ_t) and state level fixed effects (δ_s) in all our specifications.

5 Results

The first question we examine is focused on exploring the correlates of housing vulnerability during the pandemic. Table 2 summarizes results from 2 separate probit estimations and we report the marginal effects from the probit model. In the first estimation summarized in column (1), we focus solely on those who are employed. In contrast for column (2) we focus on both the unemployed and employed.

For our model summarized in column (1), we control for work type given our interest in the relationship between work type and vulnerability. 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 estimate a model where we drop the work type dummies and instead include a dummy for if an individual is employed or not-column (2).

The results in Table 2 highlight some findings that provide insight on the determinants of housing vulnerability, or what 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. The base group for income categories are individuals who earn less than $25000. Notice all coefficients are negative and significant. This result indicates that individuals in each of these income categories are less likely to be housing vulnerable than individuals with income levels less than $25000. 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 is negatively correlated with housing vulnerability. We find no evidence of gender differences in vulnerability. With respect to ethnicity/race, we find that all groups are more housing vulnerable than the base group White. A surprising result given our descriptive analysis and figures is the fact that among the employed, column (1) Asians have the highest probability of being housing vulnerable compared to Whites. In particular working Asians are 6.7% more likely than Whites to be housing vulnerable, working Blacks are 6.5% more likely than Whites and Hispanics are 2.5% more likely. When we simply considered summary statistics for ethnic groups as depicted in Table 1 and Figure 1, Hispanics and Blacks on an average are more vulnerable than other groups. However, when we include relevant controls in a regression setting, we find this interesting trend. In column (2) when we include both the employed and those who are not employed (unemployed and retired), we note that Blacks have the highest probability of being housing vulnerable compared to Whites (7.9%) followed by Asians (6.9%) and Hispanic (2.2%). This surprising high probability of being housing vulnerable for Asians over this period will be further investigated in subsequent regressions.

Family size is another important correlate. In all models summarized in Table 2 we note a positive relationship between household size and housing vulnerability, and also between 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. In the models summarized in column (1) there is no difference in vulnerability between those who are never married, widowed, or divorced/separated and the base group -married. However,

When we consider the larger sample column (2), we do find some evidence that those who are divorced and separated on average are more vulnerable that those who are married.

Our results also suggest that being employed reduces the probability of being housing vulnerable. In particular, those who are employed are 3.5% less likely to be vulnerable. Another interesting finding from Table 2 is the non-significance of the rent dummy in both columns (1) and (2). This implies that when we control for factors that affect housing vulnerability such as income and employment status, we do not find evidence that renters are more vulnerable than mortgage holders.

Our second question is focused on exploring potential heterogeneity in the evolution of vulnerability across race/ethnicity 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 3. Table 3 summarizes marginal effects from estimating three probit models. The model summarized in column (1) is based on estimating a base line mode with just ethnic dummies and interaction between these dummies and year. In column (2) we focus solely on those who are employed and in column (3) we focus on the full sample of employed or not employed individuals. In columns (2) and (3) we include controls similar to those in Table 2.

Table 3 highlights some important trends. First, all the correlates of housing vulnerability summarized in Table 2 maintain their significance in the analysis shown in Table 3. More schooling, being employed and higher income reduce the probability of being housing vulnerable and household size and higher household members below 18 increase the probability of being vulnerable. We note a slight difference for the rent dummy in Table 3. Recall in Table 2 this variable was not significant. In contrast in Table 3 column (2), when we focus solely on those employed, we find that renters are more likely to be housing vulnerable when compared to mortgage holders. However this variable is only significant at the 10 % level.

Similar to Table 2, we note that Asian, Black, Hispanic and Mixed sub-groups are all more vulnerable than Whites on an average. However, including interaction terms allows us to see how this vulnerability changed during the pandemic years compared to the White non-Hispanic sub-group. Focusing on those employed, the result summarized in column (2) 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/other ethnicity. In contrast both employed Asians and Blacks were more vulnerable than Whites in 2020 (4.1% more vulnerable for Blacks and 3.3% more vulnerable for Asians). Interestingly, there was no increase in this vulnerability for employed Blacks compared to Whites in 2021. Hispanics also did not experience an increase in vulnerability in 2021. In contrast, there was a 5.2% increase in housing 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 Asians 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 compared to Whites between 2020 and 2021, the vulnerability of employed Asians increased and decreased only 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 relative to White by 2022. For employed Hispanics, vulnerability was similar in 2020 and 2021 compared to Whites but increased relative to White in 2022.

When we consider the full sample (employed and unemployed) summarized in column (3), we find a slightly different pattern. Even after controlling for the basic factors that affect housing vulnerability, Blacks were 4.9% more likely to be vulnerable than Whites in 2020, while Asians were 3.8% and Hispanic 2%. The change for Hispanics when we compared those who were employed to the full sample suggests that their increased vulnerability above the White group is linked to those who are not employed. In terms of the evolution over time, the results in column (3) suggests that Blacks vulnerability compared to Whites increased by 3.9% by 2021 and further increased by 2022.[14] Hispanics on the other hand, on average were more vulnerable than Whites in 2020. However, they exhibited no increase in the vulnerability in 2021 and 2022. For Asians, in 2021 we find an increase in the probability of being vulnerable of 7.6% compared to Whites. 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 main finding from the results in Table 3 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, regarding a disproportionate increase in hardship faced by this group during the pandemic. We refer to this unexpected change for this group as a *chilling effect*.

The final question we address 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

[14]Base group is Whites in 2020.

[15]We do not discuss the results for the group we call mixed/others as this group has a blend of different races and ethnicity including Native Americans and those of mixed race.

separately is useful. In addition, given our interest in overall well-being and the interesting trends noted in Figure 4, we explore the correlation of worry with housing vulnerability. Worry as a variable is useful to explore given the uncertainty that characterized the pandemic. This uncertainty increased worry and anxiety which has been documented to have had significant effects on wellness and mental health. 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 HPS data, the variable worry is coded as a rank variable from 1 not worrying at all to 4 worrying almost everyday. We construct 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. It is worth noting that our inclusion of worry in our regression is not meant to suggest that worry causes home vulnerability. In fact, the reverse relationship is more likely the case. Rather, the inclusion of the worry dummy allows us to explore if after inclusion of relevant controls, there is any difference in housing vulnerability for those who worry versus those who do not.

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 Table 4. For the analysis summarized in Table 4 we focus on the full sample and include a control for employment. We do not present separate analysis for the employed. In columns (1) and (2) of Table 4, we estimate models in which we do not include year fixed effects and do not include interaction terms between ethnicity and time. In contrast 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 by ethnicity, separately from 2020-2022.

The main findings from Table 4 is as follows. First, when we focus on the results from the models summarized in columns (1) and (2), we find on average over the period (2020-2022), Black renters have the greatest vulnerability gap compared to White renters (11.3%). The second highest group is Asian renters. The gap for Asian renter of 7.2% comes as a surprise given Asians are generally viewed as the more affluent minority with high income and education levels. Hispanic renters on the other hand had the smallest gap in housing vulnerability compared to White renters (3.4%). When we focus on mortgage holders, we again see this unexpected result for Asians. On an average over the 2020-2022 pandemic period, Asians had the widest gap compared to Whites (6.3%). Blacks were 6.0% more vulnerable and Hispanics were 1.3% more vulnerable, compared to Whites.

Second, the magnitude of the correlates between variables such as income, age, education, household size, employment, worry, are consistently larger for renters than mortgage holders.

For example assuming these estimates are consistent, from Table 4 columns (3) and (4), every extra year of schooling for renters decreases the probability of being vulnerable by 0.9% while for mortgage holders this decrease is only 0.5%. Similarly being employed reduces the probability of being housing vulnerable by 4% for renters while for mortgage holders the decrease is 2.6%. In addition, across race, the gap in housing vulnerability compared to the base group White is larger for renters compared to mortgage holders.

One interesting change noticed in table 4 is the significance of the gender dummy for renters in column (3). This variable was insignificant in Table 2 and 3 but is now significant when we separately analyze renters and mortgage holders and include year fixed effects and the interaction terms. The gender dummy is still insignificant when we focus solely on mortgage holders in column (4).

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 7.6% higher probability of being housing vulnerable compared to those who don't, while mortgage holders who worry have just a 4.9% 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. For example focusing on the results summarized in columns (3) and (4) which includes relevant controls, we note no differences in vulnerability for Hispanic renters compared to White renters over the period. We note a similar trend for mortgage holders. This result is surprising and warrants further investigation. For Black renters, we note they were 6.1% more vulnerable than White renters in 2020 and this vulnerability increased significantly by 9.5 percentage points in 2021 and decreased slightly by 2022 reducing the increase in vulnerability between 2020 and 2022 to 7.9%. Black mortgage holders in contrast had a 5.4% higher probability of being housing vulnerable compared to White mortgage holders in 2020 but did not experience an increase in vulnerability in 2021 and 2022 in comparison to Whites.

For Asians in 2020 we also note heterogeneity between renters and mortgage holders. In particular we note no difference in vulnerability compared to Whites for renters but we note a 4.1% higher probability of being housing vulnerable compared to White for mortgage holders. In 2021, both Asian renters and mortgage holders experience increased vulnerability. For Asian mortgage holders, the increase in vulnerability was 4.9 percentage points. This increase disappears by 2022, returning household vulnerability compared to Whites to 2020 levels.

Asian renters in contrast experienced a significantly high increase in housing vulnerability after 2020. In particular, we note no gap compared to Whites in 2020 but a significant increase of 20.2% 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.

To further investigate this *chilling effect* for Asians as reflected in the disproportionate increase in housing vulnerability, we estimate four more regressions. These regressions serve as a robustness check on the results in Table 4. They also allow us to explore if this increase in housing vulnerability for Asians is unique to states with lower Asian population or higher Asian population. We specifically isolate the 3 states with the highest Asian population in the U.S - California, Texas and New York. We create a sub group with these 3 states and another sub group with all other states in the U.S. We then estimate the model for renters as well as for mortgage holders for each subgroup of states. Table 5 provides a summary of these estimations. Panel A is focused on all other states excluding California, New York and Texas. Column (1) is solely on renters and column (2) is estimated for mortgage holders (owners). Panel B is focused solely on individuals in California, New York and Texas. column (3) is focused on renters and column (4) on mortgage holders. The results provide an interesting and nuanced perspective. When we focus on the 47 states group (Panel A) we note results generally similar to our prior regression with respect to our control variables. The trends in 2020 for our ethnicity dummies are also similar to those in Table 4 though the magnitudes are different. When we focus on the evolution we see slight differences. In particular for Hispanics, we find an increase of 7.1% in vulnerability in 2021 although the level of significance is only 10%. Recall in past analysis, we do not find any increase in vulnerability for Hispanics in 2021 compared to mortgage holder. With respect to Asians the prior results for renters suggesting a significant increase in vulnerability in 2021 and 2022 compared to 2020 Whites is corroborated with the results in column (1). For mortgage holders on the other hand, the result of an increase in vulnerability in 2021 is not confirmed for this sub group.

Focusing on Panel B which is the sample of the 3 states with the largest Asian population, we note many similarities in the sign and statistical significance for coefficients of control variables in columns (3) and (4) with columns (1) and (2) Panel A and Table 4, though magnitudes of the coefficients are different. When we focus on the racial dummies however, we do note some significant differences. First, in 2020 Hispanic renters living in these 3 states

[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

are 6.4% more vulnerable than Whites. In prior regressions we do not find any difference in vulnerability between the two groups. Another difference is for Asian mortgage holders in 2020. In prior regressions including panel A Table 5, we find they were more vulnerable than Whites in 2020. However, there is no difference in housing vulnerability for Asian mortgage holders and Whites in the 3 state sub sample. With respect to the evolution of vulnerability over 2021-2022, we find no increase for Black renters in 2021 (in prior regressions we note an increase). However consistent with other regressions we note an increase for Blacks in 2022 compared to White renters in 2020. In Panel A we noted a significant increase in vulnerability for Hispanic renters in 2021 but we find the exact opposite for this sub sample. Specifically we note a 6.8% decrease in vulnerability in 2021 compared to Whites in 2020.

The results for Asian renters corroborate our results in panel A and provide evidence that the *chilling effect* on Asian renters is not localized. While the magnitudes are different, we find a significant increase in housing vulnerability for Asian renters living in these 3 states in both 2021 and 2022 when compared with Whites living in the same 3 states. For mortgage holders the results in panel A suggested no increase even though prior regression (Table 4) suggested increases in 2021. The results for panel B column (4) is consistent with Table 4 in this regards. Asian mortgage holders experienced a significant increase in housing vulnerability in 2021 compared to the gap with their White counterparts in 2020. As with previous regressions no increases in vulnerability for Asian mortgage holder in 2022 was noted. Our robustness checks confirm our main results regarding the *chilling effect* experience of Asians. This effect is robust and not restricted to just states with lower Asian population where social networks and social capital may be limited. Rather the effect is nation wide and more prominent for renters even though Asian mortgage holders in certain states also experienced this striking increase in housing vulnerability in 2021.

6 Summary and Conclusion

In this paper, we use Pulse Survey data from April 2020, April 2021 and April 2022 to examine housing vulnerability over the pandemic. We identify housing vulnerability using responses to two questions that allows us to identify objectively individual's facing this important challenge. The first consistent trend we noted, is that housing vulnerability was highest in 2020 across ethnic and other demographic classifications. 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 very high increase in housing

vulnerability for Asians when compared to Whites. In contrast, Hispanics on average did not experience an increase during this period. Blacks also experienced an increase but the magnitude of the increase for Asians was on average 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 on 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 on average faced no increase in vulnerability- compared to Whites. Our analysis also 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. Our robustness checks also provides evidence that this marked increase in vulnerability for Asian is not localized especially for Asian renters.

A significant take away from this paper is that Asian mortgage holders as well as renters faced increased vulnerability through the pandemic. One possible cause for this is that they could not access and (or) leverage 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 homeowners and renters.[17] There is anecdotal evidence that there was significant heterogeneity across groups in who was able to gain information on these programs, eligibility and how to successfully gain access to these programs. 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 have led 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 for Asians who are typically not viewed as a disadvantaged minority group.

7 Declarations

Ethical Approval - Not applicable

Competing interests - None

Authors' contributions - Equal contribution

Funding - None

[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.

Availability of data and materials - All data can be accessed

References

[1] An, X., A., L. Cordell, L. Geng, and K. Lee (2021) Inequality in the Time of COVID-19: Evidence from Mortgage Delinquency and Forbearance, Federal Bank Philadelphia Working Paper 21-09.

[2] An, X., A. S. A. Gabriel, N. Tzur-Ilans (2021) COVID-19 Rental Eviction Moratoria and Household Well-Being, Federal Bank Philadelphia.

[3] Brosschot, J. F., & Thayer, J. F. (2004). Worry, perseverative thinking and health. In Emotional expression and health (pp. 115-131). Routledge.

[4] Buchanan, G. J. R., Ballard, J., Fatiha, N., Song, S., & Solheim, C. (2022). Resilience in the system: COVID-19 and immigrant- and refugee-serving health and human service providers. Families, Systems, Health, 40(1), 111–119.

[5] Bushman, G. and R. Mehdipanah (2022) Housing and health inequities during COVID-19: findings from the national Household Pulse Survey. Journal of Epidemiol Community Health, 76:121–127.

[6] Coulson, N., 1999. Why are Hispanic- and Asian-American homeownership rates so low? immigration and other factors, Journal of Urban Economics, 45: 209-227.

[7] Cheng W., P. Carlin, J. Carroll, S. Gupta, F. L. Rojas, L. Montenovo, T. D. Nguyen, I. M. Schmutte, O. Scrivner, K. I. Simon, C. Wing, and B. Weinberg (2020). Back to Business and (Re)employing Workers? Labor Market Activity During State COVID-19 Reopenings , NBER Working Paper No. 27419.

[8] Chun, Y., S. Roll, S. Miller, H. Leel, S. Larimore and M. Grinstein-Weiss (2022). Racial and Ethnic Disparities in Housing Instability During the COVID-19 Pandemic: the Role of Assets and Income Shocks, Journal of Economics, Race and Policy, 6(2), 63-81.

[9] Clair, A., & Hughes, A. (2019). Housing and Health: new evidence using Biomarker Data. J Epidemiol Community Health, 73(3), 256-262.

[10] Cleary, P. D. (1997). Subjective and Objective Measures of Health: which is better when? Journal of Health Services Research and Policy, 2(1), 3-4.

[11] Enriquez, and A. Goldstein (2020). COVID-19's Socioeconomic Impact on Low-Income Benefit Recipients: Early Evidence from Tracking Surveys, Socius: Sociological Research for a Dynamic World, 6: 1–17

[12] Fairlie, K. C., K. Couch, and H. Xu (2020). The Impacts of COVID-19 on Minority Unemployment: First Evidence from April 2020 CPS Microdata. NBER Working Paper No. 27246.

[13] Gabriel, S., Rosenthal S., 2005. Homeownership in the 1980s and 1990s: Aggregate Trends and Racial Gaps, Journal of Urban Economics, 57(1): 101-127.

[14] Gover A. R., Harper S. B., Langton L. (2020). Anti-Asian hate crime during the COVID-19 pandemic: Exploring the Reproduction of Inequality. American Journal of Criminal Justice, 45(4), 647–667.

[15] Herd, P., and Moynihan, D. P. (2019). Administrative Burden: Policymaking by other Means. Russell Sage Foundation.

[16] Horne R., N. Willand, L. Dorignon, and B. Middha (2021) Housing Inequalities and : the lived experience of COVID-19, International Journal of Housing Policy.

[17] Huato, J. and A. Chavez (2021). Household Income, Pandemic-Related Income Loss, and the Probability of Anxiety and Depression, Eastern Economic Journal 47:546-570.

[18] Karpman M, Zuckerman S, Gonzalez D, and Kenney GM. (2020) The COVID-19 pandemic is straining families' abilities to afford basic needs: Low-income and hispanic families.the hardest hit. Washington, DC: Urban Institute.

[19] Kim, C. E. and H. Kim (2022). Economic Precarity and Mental Health during the COVID-19 Pandemic: findings from the Census Household Pulse Survey (2020–2021), Sociological Spectrum,42(3):195-216.

[20] Kim, A. T., C. Kim, E.T. Scott and Y. Zhang (2021). COVID-19 and the Decline in Asian American employment, Research in Social Stratification and Mobility, 71.

[21] Malpezzi, S. (2023). Housing affordability and responses during times of stress: A preliminary look during the COVID19 pandemic. Contemporary Economic Policy, 41(1), 9-40.

[22] McCarty, M. L. Perl, and K. Jones (2020). Federal Housing Policy Responses to COVID-19. [Washington, District of Columbia] : Congressional Research Service. [Getzville, New York] : William S. Hein & Company.

[23] Mundra, K. and A. Sharma (2015). Housing Adequacy Gap for Minorities and Immigrants in the U.S.: Evidence from the 2009 American Housing Survey", Journal of Housing Research, 24(1): 55-72.

[24] Mundra, K. 2020. Minority and Immigrant Experience in the Recent Housing Market: Evidence from the 2009 American Housing Survey" Immigration Symposium Special Issue, Eastern Economic Journal 46(1).

[25] Ong, P. M. (2020) COVID-19 pandemic impacts on Asian American housing. Policy Report UCLA Asian American Studies Center.

[26] Ong, P. M. and Chandara Pech (2023) Systematic Racial Inequality and COVID-19 Renter Crisis, UCLA Luskin Institute on Inequality and Democracy.

[27] Reeves, A., Clair, A., McKee, M., & Stuckler, D. (2016). Reductions in the United Kingdom's government housing benefit and symptoms of depression in low-income households. American journal of epidemiology, 184(6), 421-429.

[28] Vargas, E. D., & Sanchez, G. R. (2020). COVID-19 is having a devastating impact on the economic well-being of Latino families. Journal of Economics, Race, and Policy, 3, 262-269.

[29] Watkins, E. R. (2008). Constructive and unconstructive repetitive thought.Psychological Bulletin, 134(2), 163–206. https://doi.org/10.1037/0033-2909.134.2.163

Table 2: Housing Vulnerability- Correlates/Determinants(Marginal Effects)

Variable	Rent and Mortgage Holders Only	
	(1)	(2)
	All Employed	Employed or Not Employed
Age	0.008***	0.010***
	(0.001)	(0.001)
Age^2	-0.000***	-0.000***
	(0.000)	(0.000)
Yes School	-0.007***	-0.007***
	(0.001)	(0.001)
Male	-0.001	0.004
	(0.004)	(0.004)
HH Size	0.008***	0.008***
	(0.002)	(0.002)
Number in HH below 18	0.003	0.003
	(0.003)	(0.002)
Black Non-Hispanic	0.065***	0.079***
	(0.010)	(0.009)
Hispanic	0.025***	0.022***
	(0.008)	(0.007)
Asian	0.067***	0.069***
	(0.012)	(0.011)
Other/Mixed	0.029***	0.042***
	(0.012)	(0.011)
Rent	0.007	0.003
	(0.005)	(0.004)
Year 2021	-0.016***	-0.019***
	(0.004)	(0.004)
Year 2022	-0.019***	-0.027***
	(0.005)	(0.004)
Work in Private Sector	0.009	
	(0.005)	
Work in Tax exempt Organization	0.008	
	(0.008)	
Self employed/work in family business	0.039***	
	(0.010)	
Employed		-0.035***
		(0.005)
Widowed	0.007	0.014
	(0.014)	(0.012)
Divorce/Separated	0.003	0.015***
	(0.006)	(0.006)
Never Married	0.001	0.003
	(0.006)	(0.005)
$25,000 - $34,999	-0.020***	-0.007
	(0.007)	(0.007)
$35,000 - $49,999	-0.034***	-0.032***
	(0.005)	(0.005)
$50,000 - $74,999	-0.041***	-0.044***
	(0.006)	(0.005)
$75,000 - $99,999	-0.057***	-0.063***
	(0.004)	(0.004)
$100,000 - $149,999	-0.067***	-0.076***
	(0.005)	(0.004)
$150,000 - $199,999	-0.069***	-0.080***
	(0.003)	(0.003)
$200,000 and above	-0.074***	-0.086***
	(0.003)	(0.003)
N	80510	124865

Note: In addition to the variables in the table above we also control for state fixed effects. Base group for income is less than $25,000. 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 3: Housing Vulnerability- Time Differences Across Race (marginal effects)

Variable	(1)	(2)	(3)
Black Non-Hispanic	0.134***	0.041***	0.049***
	(0.013)	(0.012)	(0.010)
Hispanic	0.083***	0.012	0.020**
	(0.013)	(0.011)	(0.009)
Asian	0.042***	0.033**	0.038***
	(0.017)	(0.017)	(0.015)
Others/Mixed	0.065***	0.022	0.029**
	(0.019)	(0.018)	(0.016)
Year 2021	-0.040***	-0.023***	-0.027***
	(0.005)	(0.005)	(0.005)
Year 2022	-0.048***	-0.032***	-0.039***
	(0.005)	(0.005)	(0.005)
BlackX2021	0.033**	0.021	0.039***
	(0.017)	(0.016)	(0.017)
BlackX2022	0.037**	0.045**	0.050***
	(0.018)	(0.021)	(0.018)
HispanicX2021	0.010	0.010	-0.006
	(0.016)	(0.016)	(0.012)
HispanicX2022	0.017	0.033*	0.014
	(0.017)	(0.020)	(0.015)
AsianX2021	0.070***	0.052**	0.076***
	(0.026)	(0.025)	(0.024)
AsianX2022	0.019	0.040*	0.021
	(0.022)	(0.025)	(0.020)
MixedX2021	0.016	0.003	0.012
	(0.021)	(0.022)	(0.020)
MixedX2022	0.035	0.015	0.028
	(0.026)	(0.025)	(0.024)
Age		0.008***	0.010***
		(0.001)	(0.001)
Age^2		-0.000***	-0.000***
		(0.000)	(0.000)
Yrs School		-0.007***	-0.007***
		(0.001)	(0.001)
Male		-0.001	0.005
		(0.004)	(0.004)
HH size		0.008***	0.008***
		(0.002)	(0.002)
Number in HH below 18		0.003	0.003
		(0.003)	(0.002)
Rent		0.007*	0.003
		(0.005)	(0.004)
Work in Private Sector		0.008	
		(0.005)	
Work in tax exempt organizations		0.008	
		(0.008)	
Self employed/family business		0.039***	
		(0.010)	
Employed			-0.034***
			(0.004)
N	130584	80510	124865

Note:In addition to the variables in the table above we also control for state fixed effects, dummies for marital status, dummies for income categories. Base group for worker categories in column (2) and (3) is work for government.. 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 Objective Measure- Renter vs Mortgage Holder

	Panel A		Panel B	
Variable	Renter	Owner	Renter	Owner
	(1)	(2)	(3)	(4)
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	-0.009***	-0.005***	-0.009***	-0.005***
	(0.002)	(0.001)	(0.002)	(0.001)
Male	0.021***	0.007*	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)
Number in HH below 18	0.011**	0.001	0.011**	0.001
	(0.005)	(0.003)	(0.005)	(0.003)
Employed	-0.043***	-0.026***	-0.040***	-0.022***
	(0.009)	(0.005)	(0.009)	(0.005)
Worry	0.075***	0.050***	0.076***	0.049***
	(0.008)	(0.004)	(0.008)	(0.004)
Black Non Hispanic	0.113***	0.060***	0.061***	0.054***
	(0.014)	(0.011)	(0.016)	(0.016)
Hispanic	0.034***	0.013**	0.023	0.016
	(0.012)	(0.007)	(0.016)	(0.010)
Asian	0.072***	0.063***	-0.009	0.041***
	(0.022)	(0.011)	(0.026)	(0.015)
Others/Mixed	0.066***	0.023**	0.037*	0.020
	(0.019)	(0.012)	(0.024)	(0.019)
Year 2021			-0.037***	-0.019***
			(0.010)	(0.004)
Year 2022			-0.037***	-0.038***
			(0.010)	(0.004)
BlackX2021			0.095***	-0.003
			(0.033)	(0.014)
BlackX2022			0.079***	0.019
			(0.030)	(0.021)
HispanicX2021			0.005	-0.009
			(0.023)	(0.012)
HispanicX2022			0.032	0.001
			(0.029)	(0.015)
AsianX2021			0.202***	0.049***
			(0.067)	(0.022)
AsianX2022			0.131***	0.014
			(0.059)	(0.019)
MixedX2021			0.031	0.004
			(0.037)	(0.022)
MixedX2022			0.059	0.011
			(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 income categories and 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 5: Housing Vulnerability States with Highest Asian Population Vs Other States

	Panel A		Panel B	
	States excluding CA NY TX		California, New York, Texas	
Variable	Renter	Owner	Renter	Owner
	(1)	(2)	(3)	(4)
Age	0.016***	0.005***	0.010**	0.010***
	(0.002)	(0.001)	(0.004)	(0.003)
Age^2	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Yrs of School	-0.010***	-0.005***	-0.007**	-0.004
	(0.002)	(0.001)	(0.004)	(0.003)
Male	0.013*	0.005	0.034**	0.011
	(0.008)	(0.004)	(0.017)	(0.011)
HH Size	0.004	0.005***	0.014**	0.015***
	(0.003)	(0.002)	(0.006)	(0.004)
Number in HH below 18	0.018***	0.002	-0.001	-0.008
	(0.005)	(0.003)	(0.010)	(0.006)
Worry	0.074***	0.046***	0.075***	0.056***
	(0.007)	(0.004)	(0.017)	(0.010)
Employed	-0.032***	-0.020***	-0.058***	-0.027**
	(0.008)	(0.004)	(0.020)	(0.012)
Black Non Hispanic	0.029**	0.043***	0.156***	0.102***
	(0.015)	(0.015)	(0.049)	(0.051)
Hispanic	0.002	0.013	0.064**	0.015
	(0.016)	(0.010)	(0.031)	(0.020)
Asian	-0.008	0.060***	0.004	0.008
	(0.025)	(0.018)	(0.047)	(0.026)
Others/Mixed	0.038*	0.006	0.040	0.065
	(0.023)	(0.012)	(0.065)	(0.072)
Year 2021	-0.048***	-0.019***	0.004	-0.017
	(0.009)	(0.004)	(0.028)	(0.015)
Year 2022	-0.035***	-0.036***	-0.050*	-0.049***
	(0.010)	(0.004)	(0.026)	(0.014)
BlackX2021	0.109***	0.007	0.040	-0.038
	(0.034)	(0.015)	(0.066)	(0.023)
BlackX2022	0.050**	0.031	0.144**	-0.020
	(0.026)	(0.024)	(0.083)	(0.038)
HispanicX2021	0.071**	0.008	-0.068*	-0.034
	(0.034)	(0.016)	(0.028)	(0.020)
HispancX2022	0.034	0.012	0.039	-0.011
	(0.030)	(0.017)	(0.052)	(0.029)
AsianX2021	0.203***	0.020	0.160*	0.097**
	(0.066)	(0.020)	(0.105)	(0.056)
AsianX2022	0.112**	0.021	0.176**	0.000
	(0.057)	(0.022)	(0.105)	(0.035)
MixedX2021	0.022	0.026	0.065	-0.048
	(0.034)	(0.023)	(0.116)	(0.028)
MixedX2022	0.033	0.047*	0.125	-0.054
	(0.040)	(0.030)	(0.123)	(0.023)
N	33773	72533	7723	10606

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