Impact of the Pandemic on the Housing and Rental Markets: Evidence from U.S. Metropolitan Statistical Areas

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Abstract

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A distinguishing characteristic of the COVID-19 economic crisis is the unprecedented decline in human mobility. This thesis aims to examine the effect of the pandemic on housing and rental prices in the United States. Using 315 Metropolitan Statistical Areas (MSAs), I calculate their respective real estate market's exposure to mobility changes, the increase in work-from-home (WFH), and the increase in state mandates to combat the virus' spread. Additionally, I document whether MSAs dominated by Blacks, Latinos, and Hispanics are affected more than others. I find that as mobility decreases by 1%, there is a 0.07% and 0.3% decrease in housing and rental prices, respectively. The increase in WFH and state stringency positively affect the overall housing prices but does not affect the rental prices. I also find that the minority-dominated MSAs have a significant and negative impact from the pandemic for both prices.

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1. Introduction

The COVID-19 pandemic had an extraordinary effect on every country's economic activity and human mobility. On January 20, 2020, the Centers for Disease Control and Prevention (CDC) confirmed the first case of COVID-19 in the United States, and by March of the same year, the World Health Organization (WHO) declared COVID-19 a worldwide pandemic. This prompted President Donald Trump to declare a national emergency. Spatt (2020) claims that various health precautions, including lockdowns, travel restrictions, job terminations, and many more, have impeded the interconnection of economic elements as human mobility significantly declined. The combination of these stringent policies and the uncertainty from the pandemic led to the most severe global economic downturn experienced since 1930 (Shen et al., 2020). These measures were just the start of a turbulent period that would see significant changes to the everyday aspect of daily life.

The decline in mobility is among the major changes that came about during the onset of the pandemic. Most states issued policies to combat the spread of COVID-19, notably the closure of schools, gathering restrictions, and stay-at-home orders (Yörük, 2022). The effectiveness of these rules in limiting mobility and social contacts is documented as a success in lowering the infection rate (Engle et al., 2020; Dave et al., 2021). Aside from stay-at-home orders, Chernozhukov et al. (2021) find that private behavioral responses, such as deliberate social isolation, are also significant drivers of the decline in mobility. All these mobility reductions play a significant role in consumers' housing decisions (Yörük, 2022).

One significant effect of the pandemic is the rise of remote work. As the virus spread, many companies adopt remote work to comply with health guidelines and protect their employees. Bartik et al. (2020) note that a significant number of office workers began working from home. Dingel and Neiman (2020) find that 37% of all jobs in the United States can be performed remotely. Apart from labor, visits to consumption amenities such as restaurants and other leisure activities suffered an abrupt decline (Cox et al., 2020). The appeal of dense neighborhoods and large cities, where jobs and consumer amenities are spatially concentrated, has decreased. This reduction in mobility and shift in preferences significantly impact people's housing decisions and residential property's value.

The COVID-19 pandemic has also shed light on existing social and economic disparities, with minority populations bearing the burden of its impacts. The pandemic has disproportionately affected low-income and minority populations, with increased infection and mortality rates and greater economic hardship (McNeely et al. 2020; Mishra et al., 2021). These communities have also been affected differently by the pandemic's impact on housing prices, with some facing a greater risk of homelessness and eviction due to job loss and reduced income.

This study examines how the COVID-19 pandemic affects housing and rental prices in the United States. I focus in detail on the significance of the decrease in human mobility. To my knowledge, no other paper focuses on the effect of the changes in mobility on residential house prices and rental prices during the pandemic. I also assess the effect of the increase in work from home and stringency of policies and mandates implemented by each state during the two years. Specifically, I study their impact on the prices of houses and rent within major Metropolitan Statistical Areas (MSA), areas with high population density at their centre, and social and economic activities in the surrounding areas. MSAs are chosen over cities or counties as they cover a higher number of areas and provide more accurate data points that otherwise would be difficult to find for more focused and smaller areas.

To achieve this, I create a panel dataset covering the pre-pandemic years of 2018 to the post-pandemic years of 2021. The data included is from 315 MSAs across the United States, which provides a comprehensive and diverse range of real estate market trends. This is the highest amount of MSAs included in a study as of the time writing this paper. I then run multiple regression models with time-fixed effects to measure the effect of mobility reduction, remote work, state stringency, and percentage of minority residents in the studied MSAs.

The results indicate that an increase in mobility, WFH, and state stringency is associated with higher housing prices. The findings are further confirmed using different property types categorized by the number of bedrooms. On the other hand, rental prices were also positively affected by increases in mobility but had no effect to changes in WFH and state stringency. Neighborhoods with a high percentage of minority populations experience a decline in both housing and rental prices. These findings provide insights into how future mobility shocks other than the pandemic, may affect the real estate market.

The remainder of this paper is structured as follows: Section 2 cover the previous literature, which looked at how different factors shaped the real estate market during the pandemic. This section examines the key findings from previous studies, identifies literature gaps, and highlights areas that require further research. In section 3, I propose hypotheses based on the insights gained from the literature review. Section 4 provides a detailed description of data sources, and the formation of variables that are used in the study. Section 5 describes the methodology, which will involve the use of regression analysis to test the hypotheses. Section 6 presents the analysis results for both the housing and rental prices. Finally, section 7 concludes the study by summarizing the study's key findings and highlighting the research's contribution to the existing literature.

2. Literature Review

While there have been several studies on the impact of COVID-19 on the real estate market, few have considered the influence of reduced mobility, increased remote work opportunities, and state regulations while also controlling for the effect of minority groups. The pandemic has a diverse impact on markets worldwide, and it's essential to explore its effects on the real estate market. In this literature review, I examine research on the effects of the pandemic on housing and rental prices, including papers that looked at WFH and minority groups.

2.1 *Housing Price and COVID-19*

Liu & Su (2021) study the effect of the COVID-19 pandemic across 25 MSAs from January 2016 to April 2021. Using zip code data of inventory, asking rent, and home prices, they find a shift in demand away from dense areas with a high population to housing in less dense neighborhoods. Their regression results offer three explanations as to why this shift has occurred: (1) the rise of remote work; (2) the closure of consumption amenities, such as restaurants and shopping malls; and (3) the lack of housing supply elasticity. Zhao (2020) thoroughly examines the housing market recovery after April 2020. The author finds that due to the Federal Reserve's monetary easing, there is a rise in real estate prices and demand. Contrary to Liu & Su (2021), Zhao (2020) finds that both dense suburban and rural areas experienced higher prices and demand.

Similarly, Yörük (2022) uses new listings, total inventory, newly pending sales, median list price, and other housing market indicators from January 1, 2020, to December 12, 2020, for 100 MSAs to explain the impact of state-level mandates that are implemented to fight the pandemic. Utilizing an event study methodology and difference-in-differences models, Yörük (2022) reveals that the closure of non-essential businesses in specific states decreased new home listing by 11% and total inventory by 3.5%. D'Lima et al. (2021) also study the effect of the pandemic on pricing using major MSAs from January 2019 to December 2020. The authors find that the price depended on population density, property size, and floor area ratio to lot size. The price of a three-bedroom property decreases by 1.4% in dense areas but increases by 1.5% in less dense areas, such as suburbs. D'Lima et al. (2021) agree with Liu & Siu (2021) that there is a large shift away from dense areas such as downtown. D'Lima et al. (2021) also agree with Yörük (2022) regarding the decrease in new home listings and pending home sales in the major cities studied.

On the other hand, Wang (2021) finds that some areas experienced a positive effect on housing prices during the onset of the pandemic. Similar to Yörük (2022), Wang also uses a difference-in-differences model for major cities in the US with a variety of state-level policies, economic features, and geography from July 2018 to October 2020. Out of the five major cities studied, Honolulu is the only one to experience a decrease in housing prices, potentially due to the higher reliance on tourism and service industries. The other cities studied see an appreciation in housing prices, highlighting that these cities have better amenities and depend less on service industries.

2.2 *Rental Prices, Work-From-Home, and COVID-19*

Relative to the housing price literature, rental prices are not as focused on in the United States from a financial perspective. Using high-frequency location data from mobile phone pings, Gupta et al. (2022) study 30 MSAs and find that rent prices decreased in downtown and city centers but predicted future growth in urban areas to surpass suburban ones. Their conclusion also follows Liu and Su (2021), which shows a significant shift away from downtown. Similarly, Ramani and Bloom (2021) show that an increase in WFH because of COVID-19 affected migration patterns and rent in major United States cities and surrounding suburbs. They find that the surrounding suburbs of major cities see a rent increase, whereas the city's center experienced a decrease, calling this phenomenon the “donut effect”.

A number of other papers also contend that working from home will have a negative and substantial effect on the urban structure (Bartik et al., 2020; Brueckner et al., 2021; Davis et al., 2021). Delventhal et al. (2021) look at the concept of a permanent increase in WFH in the Los Angeles metropolitan area. They conclude that the average price of housing and rental markets in the city's core fell while the suburbs’ prices increased. This further confirms Ramani and Bloom (2021) “donut effect”. All conclusions in the literature confirm that WFH will add significant downward pressure on rental and housing prices in the urban United States. Bick et al. (2020) and Barrero et al. (2021) both contend that more than a third of employees will continue to WFH even after the pandemic. Therefore, the increase in WFH will continue to affect individuals’ short- and long-term housing decisions.

In the commercial real estate (CRE) literature, Rolheiser et al. (2023) study how the shift to WFH affects CRE prices in the United States. They find that urban CRE prices decrease by 8% on average since January 2020. The major price decline in the urban areas is a decrease of 12% for cities with high WFH propensity. On the other hand, they also find that suburban CRE prices remain stable or increase in the same period. Rolheiser et al. (2023) suggest that the price changes were due to a major shift to the suburban areas. This implies that residents leave the dense urban areas to be able to afford to have a home office or escape the high prices of rent and mortgages.

2.3 *Minority Dominated Areas and COVID-19*

Depending on the majority race of the area, the pandemic has a different effect on the neighborhoods’ real estate market. Tai et al. (2021) find an unequal socioeconomic effect on people of color in the United States. A greater proportion of Black and Latino respondents than White respondents reported being unable to pay their rent and mortgage. Similarly, before the pandemic, Black and Latino residents are more likely to be in debt than White people. This results in higher eviction rates that are twice as high for Black people than White people (Tai et al., 2021). Using a difference-in-differences methodology, Ghekiere and Verhaeghe (2022) observe ethnic discrimination in a Belgian city's real estate market and identify lower incomes as a possible reason.

Benfer et al. (2021) also find that low-income populations and Black and Hispanic/Latinx people faced a higher risk of eviction during the pandemic. Using 49 of the largest MSA in the United States and online rental listings, Kuk et al. (2021) find that an increase in the number of cases of COVID-19 leads to a decrease in the median and mean rent between March to June 2020. They examine neighborhood prices by race and conclude that majority-white neighborhoods see an increase in housing prices and rent, whereas majority-black neighborhoods see a decline.

This study adds to the understanding of the impact of the COVID-19 pandemic on housing and rental prices in the United States. Unlike previous studies that only focus on the earlier stages of the pandemic, I analyze the data from the entire year of 2021, when vaccines are more accessible, and restrictions vary across states. Additionally, I focus on the mobility shock's effect and the effects of remote work and state restrictions. By doing so, I aim to provide a more thorough and complete picture of the pandemic's impact on housing and rental prices.

3. Hypotheses Development

Hypothesis 1-a: *Mobility shock leads to a decline in housing prices.*

Hypothesis 1-b: *Mobility shock leads to a decline in rental prices.*

The fall in mobility, caused by voluntary social separation and government actions, has significantly affected the real estate market. The closure of amenities, such as restaurants, gyms, and malls, has drastically reduced living demand in urban areas (Liu and Su, 2021). Aside from the closure of consumption amenities, many people choose to self-isolate for health and prevention reasons (Maloney and Taskin, 2020). Therefore, it is more likely that the shock in human results in a decrease in both rental and housing prices.

Hypothesis 2-a: *Increase in work from home leads to an increase in housing prices.*

With the rise in WFH, employees have more flexibility in choosing where they perform their work. This can include different cities within or out of the same MSAs, or even cities in different states. In many cases, this enables employees to select locations with lower housing costs and a higher quality of life, which can be especially appealing to those who reside in expensive urban areas. Literature shows an increase in demand for homes in suburban areas (Liu and Su, 2021), which should correspond to an increase in home prices. Although demand for urban residence fell, Case and Shiller (2003) suggest that prices are sticky downward; therefore, the effect of an increase in suburban prices could have a more substantial effect.

Hypothesis 2-b: *Increase in work from home leads to a decrease in the rental prices.*

As for rental prices, Ramani and Bloom (2021) show that urban areas experienced a decrease in rent and suburban areas saw an increase in demand. The effect of this flexibility could lead to an overall decrease in rent as people have the option to move to larger residents further away with at most the same price or move to somewhere further and cheaper.

Hypothesis 3-a: *Housing prices in higher minority race areas suffer more than others.*

Hypothesis 3-b: *Rental prices in higher minority race areas suffer more than in other areas.*

Evidence show that the COVID-19 pandemic disproportionately impacts the rental and housing prices in the United States, with a higher proportion of people of minority races affected (Kuk et al., 2021). Several factors m ay contribute to this unequal impact, including the pandemic's disproportionate impact on minority groups and that these populations are frequently more vulnerable to economic downturns because of institutional disparities. As a result, it is likely that the residential estate market in areas with a higher concentration of minority races suffered more than others.

Hypothesis 4-a *The Metropolitan Statistical Areas with stricter policies for combating the virus have a more substantial adverse effect on housing prices.*

Hypothesis 4-b: *The Metropolitan Statistical Areas with stricter policies for combating the virus have a more substantial adverse effect on rental prices.*

Regions with more stringent regulations for addressing the COVID-19 pandemic are likely to experience a severe impact on the rental and housing prices. These stricter policies may include lockdowns, travel restrictions, and business capacity limits, disrupting the local economy and decreasing demand for rental properties and homes. For instance, if companies in a MSA are obligated to close or operate at a reduced capacity due to tight pandemic regulations, this may result in job losses or a reduction in income for some inhabitants, reducing their ability to pay rent or a mortgage. In addition, tight pandemic laws may make it more difficult for people to relocate or examine properties in person, decreasing demand for rental properties and homes (Yörük, 2022). This results in a drop in both rental and housing prices.

4. Data Collection & Sample Selection

For this study, I collect data from 315 MSAs across 1,049 counties spanning a period of four years, from 2018 through 2021. I select this timeframe to include two years of pre-pandemic data, 2018 and 2019, which serve as a baseline for comparison with the pandemic years of 2020 and 2021. It's important to note that some MSAs are spread across multiple states, therefore state level variables will focus on the state of the principal city within the MSA. This ensures that state-specific variables that may influence the real estate market are accounted for, such as differing state regulations or policies. Through this approach, I aim to provide a more accurate and comprehensive understanding of the pandemic's impact on the real estate market in the United States.

4.1 *Home Value Estimates*

Like Liu and Su (2021), Gupta et al. (2022), and Ramani and Bloom (2021), I utilize the Zillow Housing Data for housing and rent prices. Specifically, I use Zillow's Home Value Index (ZHVI) to estimate home prices. ZHVI is an MSA level, smoothed, and seasonally adjusted monthly index that represents all home values in the 35^{th} to 65^{th} percentile range. This comprehensive index calculates its estimates on more than 100 million U.S. properties. ZHVI also uses a hedonic model to estimate house prices for periods when a property is not sold. The estimates are annualized by taking the average of all the months each year. Zillow also offers ZHVI for different housing segments, including single-family residences, one-bedroom, two, three, four, and five or more bedrooms. I use these segmented ZHVI for the robustness tests. To represent the change in housing prices, I use the year-over-year percentage change of ZHVI, as shown in Equation 1, as the primary independent variable.

$$\%\Delta ZHVI = \frac{((ZHVI\ at\ time\ t) - (ZHVI\ at\ time\ t{-}1))}{(ZHVI\ at\ time\ t{-}1)} \quad (1)$$

In addition to the ZHVI, I also incorporate the Zillow Observed Rent Index (ZORI) to measure the impact of the pandemic on the rental real estate market in each MSA. Unlike the ZHVI, which assesses the value of homes, ZORI calculates the rental prices of all properties, regardless of whether they are listed. Zillow carefully reweights properties based on factors such as construction year, structure type, and rental year to eliminate any compositional biases that may arise from shifts in listed properties. Like the ZHVI variable, I calculate and use the year-over-year percent change for rent prices, as shown in Equation 2, and use it as the independent variable[1].

$$\%\Delta ZORI = \frac{((ZORI\ at\ time\ t) - (ZORI\ at\ t{-}1))}{(ZORI\ at\ time\ t{-}1)} \quad (2)$$

In Figure 1 below displays monthly price data for ZHVI and ZORI from 2018-2021. The graph illustrates how home prices and rents evolved over a four-year time frame. One of the key observations is that both ZHVI and ZORI show significant growth during 2021, notably in the latter half of the year. This finding justifies the importance of including data for the entire year of 2021.

[Figure 1 about here.]

[1] To reduce the impact of outliers, I apply 1% winsorization to the ZORI data, and replace extreme values with values at the 1st and 99th percentiles.

4.2 Mobility & Stringency

The empirical analysis uses social distancing data I obtain through Google Community Mobility. The data availability begins on February 15, 2020. It provides statistics at the county level on the percent change of visits to or time spent in six location types compared to each county's baseline or median level of activity on that day of the week from January 3, 2020, to February 6, 2020. The six location types are groceries, pharmacies, parks, transit stations, retail and recreation areas, residential properties, and workplaces. Smartphone users who enabled the location history feature to allow to be traced for their visits to and time spent in various locations. By tracking visits to these locations, the impact of social distancing measures on mobility can be understood.

Following Illin et al. (2021) and Yönder & Yücel (2022) forthcoming paper, I focus on retail and recreational, transportation station, and office visits. To refine the data further, I eliminate the parks category from the mobility variable due to the lack of economic interpretation (Chen et al., 2020; Chernozhukov et al., 2021). The residential category is also dropped from the mobility measure as it correlates highly with the retail and recreation category (Chernozhukov et al., 2021). I annualized each county-level category and took the mean of the three selected categories to form a combined mobility variable. I then convert the county-level mobility variable to the MSA level by grouping the county-level mean by the MSA they belong to.

To visually represent the data, Figure 2 displays two maps of the United States by MSA division for each year since the pandemic's start. According to the graph, mobility drastically drops in 2020, most likely because of the severe COVID regulations. The trend gradually changes in 2021 as COVID restrictions and cases decline, leading to increases in mobility. The analysis of the impact of mobility on the real estate market can provide valuable insights into how the pandemic affected different regions and how the real estate market may respond to mobility trends in the future.

[Figure 2 about here.]

The Stringency Index is a metric that assesses the level of strictness of mandates and policies put in place by state governments to combat the COVID-19 pandemic. The index is taken from the Oxford COVID-19 Government Response Tracker (OxCGRT), a project run by the Blavatnik School of Government at Oxford University that tracks the responses of 180 nations to the pandemic and monitors twenty different indicators (Hale et al., 2021). The formulation of the Stringency Index involves using nine distinct categories, including school closures, workplace closures, canceled public events, restrictions on gatherings, public transportation limits, stay-at-home orders, domestic travel, international travel controls, and public information campaigns. The Stringency Index specifies the categories for each state in the United States.

Figure 3 shows two maps of the United States by state for each year since the pandemic began. In 2020, most states are classified as highly stringent due to the implementation of strict measures to curb the spread of the virus. However, in 2021, the states begin to reduce their restrictions and allow for more mobility. The Stringency Index offers valuable insights into the policy responses of different states and how they have changed over time in response to the pandemic.

[Figure 3 about here.]

__4.3__ Demographic & Economic Characteristics

Controlling for demographic and economic data about the MSA's population is essential for conducting a thorough analysis of the impact of the COVID-19 pandemic on housing and rental prices and the local economy. Demographic and economic data about the MSA's local population is obtained from the United States Census Bureau. The data include various factors such as the number of people working from home, the percentage of Black, Hispanic, and Latino residents, the number of households, the unemployment rate, and the educational attainment level (i.e., the percentage of people holding a bachelor's degree or higher). In addition, data on population and per capita income are gathered from the Bureau of Economic Analysis. The income per capita variable is estimated using the total annual income from private, local, and federal sources. The demographic and economic data that is gathered from these sources provide a comprehensive overview of the MSA's economic and social landscape. This is essential in order to understand the influence that the COVID-19 pandemic has on the local housing prices.

To calculate the proportion of the total population working from home or WFH, I divide the number of individuals working from home by the MSA's total population to derive the percentage of the total population working from home (WFH). This is shown in Equation 3. Similar to in Equation 4, I perform the same calculation using total Black, Hispanic, and Latino residents within the MSA to obtain the Minority Percentage.

$$WFH = \frac{Number\ of\ People\ Working\ From\ Home}{Total\ Population} \tag{3}$$

$$Minority\_Percentage = \frac{Black,\ Hispanic,\ and\ Latino\ Population}{Total\ Population} \tag{4}$$

5. Data Description & Model

5.1 Data Description

In Table 1, I provide the descriptive statistics for the independent variables. I divide them into two sections, before COVID-19, which includes 2018 and 2019 data, and during COVID-19, which includes 2020 and 2021 data. I show the difference in each variable's average value and the statistical significance of the difference. Mobility does not take any values before COVID-19 since it measures the pandemic's impact on mobility reduction using January and February 2020 as the base value. Likewise, the Stringency Index does not have a value before 2020 since it measures the states' response to the pandemic. During COVID-19, the mean of mobility is -14.8%. On average, the Stringency Index is 47.23. Minority Percentage is 26%, and WFH is 4.6%. I observe a significant change in income per capita, WFH, and bachelor's degree or higher. WFH noticeably increases at the maximum range of 19% versus 6.7% before COVID-19, suggesting a significant shift from office work to WFH to combat the rapid infections.

[Table 1 about here.]

Table 2 provides the Pearson correlation matrix, including the probability of the coefficients. Examining each pair of variables in the matrix, the highest correlation is -0.811 between mobility and Stringency. This correlation is moderately high, negative, and significant. This correlation is because both variables hold the same value for years before the pandemic, which is zero since they are used as baselines. Aside from these two variables, the other moderate correlation pair is between bachelor's degree percentage and income per capita, which is 0.665. All other variables have a correlation of 0.4 or less with each other.

[Table 2 about here.]

5.2 *Model*

To analyze the relationship between the pandemic and housing/rental prices, I form a panel dataset using data from 2018 to 2021, introduce a one-year lag to the independent variables, and test the relationship between them by running a regression. The association between the dependent variables and the pandemic is better described by data from the start of the year instead of the end. Although not shown, I run the same model without any lags and determine that the lagged model has a higher predictive power. In the analysis, the following models are utilized:

$$\%\Delta y_{i,t} = \beta_0 + \beta_1 Mobility_{i,t-1} + \beta_2 WFH_{i,t-1} + \beta_3 Minority\_Percentage_{i,t-1} + \beta_4 x_{i,t-1} + \gamma_t + u_{i,t} \quad (5)$$

$$\%\Delta y_{i,t} = \beta_0 + \beta_1 Mobility_{i,t-1} + \beta_2 WFH_{i,t-1} + \beta_3 Minority\_Percentage_{i,t-1} + \beta_4 Stringency\_Index_{i,t-1} \quad (6)$$

$$+ \beta_5 x_{i,t-1} + \gamma_t + u_{i,t}$$

Where the dependent variable, $y_{i,t}$ is the year-over-year percentage change in ZHVI and ZORI for MSA i at year t. The primary dependent variables are $Mobility_{i,t-1}$, $WFH_{i,t-1}$, $Minority\_Percentage_{i,t-1}$, and $Stringency\_Index_{i,t-1}$. The control variables, such as demographic and economic variables, are represented by $x_{i,t-1}$, and the year fixed effects by γ_t.

If mobility declines and WFH increase impacts the rental and housing prices negatively, I expect $\beta 1$ and $\beta 2$ to hold a negative value. Similarly, if the MSA has a higher Minority Percentage and is affected more by the pandemic, I expect $\beta 3$ to be negative. Like Equation 5, Equations 6 includes the Stringency Index. I expect the Stringency Index to be negative if the increase in mandates and COVID-related policies results in a shift away from the area. The control variables are represented by $x_{i,\ t-1}$, and include the natural log of total households, income per capita, bachelor's degree or higher percentage of the total population, and unemployment rate. In all models, I include year-fixed effects and a constant.

6. Results

6.1 *Pandemic's Effect on the Housing Market*

In Table 3, I present the panel regression results as described in Equation 5. In column (1), I exclude the main independent variables and focus on the control variables. I find that lagged natural logarithm of total households is statistically significant and positive at the 1% level. This shows that an increase in total households by 1 unit would result in an increase of 0.3%. I also observe income per capita[2] to be statistically significant at the 10% level but negative. This means that an increase in income per capita by $10,000 would result in a decrease in housing prices by -0.03%. This is surprising and may suggest that the areas with high income per capita already had high and inflated real estate prices pre-pandemic.

[Table 3 about here.]

In column (2), I include the lagged Minority Percentage of the MSA and find that it is negative and statistically significant at the 1% level. This result agrees with Benfer et al. (2021) and Kuk et al. (2021) that Black and Latinx people have more difficulties during the pandemic, and their neighborhoods see a price decrease. Specifically, this shows that as the percentage of minority residents in the MSA increases by 1%, house prices fall by 0.024%. In column (3), I include the

[2] Income Per Capital is scaled down by a factor of 1000000 to facilitate its interpretation in the regression model.

lagged WFH variable. It is positive and statistically significant at the 1% level. This means that as WFH increases by 1%, housing prices increase by 2%. This may suggest that the flexibility of living away from the urban areas affects the suburban areas' prices more than the decrease in demand for urban areas. I also find that the number of people holding bachelor's degrees or higher is negative and significant at the 1% level. Likewise, the unemployment rate becomes positive and statistically significant at the 1% level. In columns (4), the results and significance from columns (2) and (3) remain the same.

I include mobility in column (5) and exclude the previous variables. I do not find any significance in human mobility and housing prices. I emphasize that these effects are quantified while local macroeconomic conditions are also controlled for. Likely, some effect of mobility changes is already reflected in local variables such as unemployment and income per capita. Therefore, the impact quantified in the panel regressions captures the total effect of the mobility shock beyond what is already captured with control variables and time-fixed effects.

In column (7), I include all other variables without Minority Percentage. Mobility is positive and statistically significant at the 1% level. I also find all the variables to be significant in column (8). This shows that as mobility increases by 1%, home prices increase by 0.01% - 0.07%. WFH has the largest estimated coefficient, in absolute value, of 2% when WFH increases by 1%. The adjusted R-squared for all the models are very high, ranging from 62% to 67%, meaning that the model is a strong fit for explaining the effect of the pandemic on home prices. The results from Table 3 confirms hypothesis 1-a, 2-a, and 3-a.

6.2 *Pandemic's Effect on the Rental Market*

Table 4 displays the outcomes of running the panel regression described in Equation 5 to analyze the change in the rental market. In column (1), I exclude the main independent variables and focus on the control variables. I find that both the number of total households and bachelor's degrees are negative and statistically significant at the 5% and 1% levels, respectively. This shows that as total households and bachelor's degree holders decline by 1 unit and 1%, rent prices grow by 1.27% and 0.265%, respectively.

[Table 4 about here.]

In column (2), I include Minority Percentage and find it significant at the 5% level, showing that an increase in Minority Percentage by 1% results in a decline in rent prices by 0.08%. This result agrees with Tai et al. (2021), who show that if minorities face more challenging times paying rent and are more likely to be in debt, then the prices in these MSAs would likely reflect the result. In columns (3) and (4), I include WFH and find that it is positive but not significant. Compared to how WFH affected housing prices, the increase in flexibility from working from home does not result in lower rent. This is a very surprising result since the ability to work away from the office does not result in residents moving away from high rents to cheaper rents. Because of these results, hypothesis 2-b is rejected. It must be that prices are also sticky downwards for rent as they are for housing prices (Case and Shiller, 2003). This finding contrasts with the findings from Ramani and Bloom (2021).

In column (5), I include mobility but not WFH or Minority Percentage. It is important again to note that some influence of mobility shifts is already represented in local variables. The impact quantified in panel regressions captures the full effect of the mobility shock beyond what is already recorded by control variables and time-fixed effects. Mobility is positive and statistically significant at the 1% level. This shows that an increase in mobility by 1% results in an increase of 0.249% in rent prices. Because of the mobility variable factors in retail and recreational visits, transportation station visits, and office visits, I speculate that the effect is likely due to being able to travel, shop, and work in person. Columns (6), (7), and (8) show the same significance and magnitude for mobility, Minority Percentage, total households, and bachelor's degree holders. Relative to the housing prices model, the adjusted R-squared is much lower at 12%, showing that the model is a better fit for predicting housing price changes. The results from this Table 4 confirms hypotheses 1-b and 3-b. Hypothesis 2-b, which is that WFH offered flexibility in decision-making, which would allow for rents to fall as people move from the urban areas, is rejected.

6.3 *Stringency Effects on Housing and Rental Market*

I now focus on the effects of state stringency on the housing and rental market. I present the regression results for both the changes in ZHVI and ZORI, as demonstrated in Equation 6 and reported in Table 5. In ZHVI (1), I include regression results for stringency and control variables. Specifically, I find that Stringency is positive and statistically significant at the 1% level and that an increase of the Stringency Index by 1 unit increases the housing prices by 0.14%. This shows that housing prices increase as states add more regulations to combat COVID cases. I see the same effect in ZHVI (2), where all the variables are statistically significant again. The adjusted R-squared is higher than the previous models at 67%. Therefore, I reject hypothesis 4-a, which is that the more stringent the state is, the more detrimental effect it would have on its housing prices.

[Table 5 about here.]

In contrast to the results from ZHVI, in column ZORI (1), Stringency is not significant. This shows that increased government regulations do not significantly affect rent prices. I attribute this to the eviction moratorium during the onset of COVID. In 2020, 43 states enacted the Cares Act eviction moratorium, which does not allow landlords to evict their tenants between March 2020 and August 2020 (McCarty & Carpenter, 2020); in some states, the moratorium lasted till the beginning of 2021. The areas with these eviction bans make rent less likely to increase. Another reason could be that landlords refused to reduce their rents because they still had to pay their mortgages during the pandemic. The results in column ZORI (2) reflect column 8 from Table 4. Therefore, I reject hypothesis 4-b as there is no significant effect shown in the results.

6.4 *Pandemic Effect on Housing Market by Property Type*

I conduct a comparative analysis of the impact of all variables on housing prices, categorized by property type. I run the same regressions as earlier on single-family homes, one bedroom, two bedrooms, three bedrooms, four bedrooms, and five or more bedrooms. This is done as a robustness test to ensure the results earlier using ZHVI. The results of these regressions are shown in Table 6. Panel A shows the regression in single-family homes. In column (2), I see that the Minority Percentage is negative and statistically significant at the 1% level. Specifically, an increase in the Minority Percentage by 1% decreases single-family home prices by 0.02%.

In columns (3) and (4), I see that WFH is significant and positive at the 1% level, meaning that an increase of WFH by 1% results in an increase of almost 2% in single-family home prices. These results both reflect the results in Table 3. In columns (5) and (6), I do not observe significance for mobility, but I do observe that they do not have the same magnitude when including Minority Percentage. In columns (7) and (8), I find that mobility is positive and significant, specifically that an increase in mobility by 1 percent results in an increase of 0.6% in single-family home prices. I also see that WFH, and Minority Percentage are also statistically significant. In column (9), I observe a positive and statistically significant at the 1% level for the Stringency Index, showing an increase of 0.14% if Stringency increases by 1 unit. In column (10), I find that mobility, WFH, and Stringency are positive and statistically significant at the 1% level, while Minority Percentage is negative. The results from Panel A mirror reflect the results from Table 3.

[Table 6 about here.]

In Panel B, I show the regression results for Equations 5 and 6 on one bedroom. The results do not reflect panel A and only show mobility as positive at the 5% level. Specifically, an increase in mobility by 1 percent results in an increase of 0.07%-0.08% in one-bedroom prices. The model does not accurately predict one-bedroom properties; the highest adjusted R-squared is 43%. I expect the results to differ from single-family homes because the demographic is substantially different. There would be fewer people living in one bedroom compared to single-family homes; therefore, I expect a less significant outcome for the variables used. In addition, the targeted residents for one-bedroom apartments are usually university or college students who are renting. Once these students complete their studies, there will not be a reason to remain in the area for longer. One bedrooms are primarily in urban areas and will show a more focused impact in the core areas than the entire MSA. Therefore, the results are expected to be different for one bedrooms compared to residential places with more rooms.

For the two-bedroom properties shown in Panel C, I find similar results to panel A in terms of significance and magnitude, except for the Minority Percentage, which shows a nonsignificant but negative result. In panel D, I show the regression results for three-bedroom properties. The results here reflect the results in panel A, and this is likely to many single-family houses having three bedrooms within them. I have similar results in panels E and F, which show the regression results for four and five bedrooms or more, respectively. I highlight that the model in panel F column (10) shows the significance for all the variables and has the highest adjusted R-squared at 69.3%, which best predicts the price change for properties with five bedrooms or more. The assumption for Panel C – F sharing similar results to Table 3 is that the demographics of the residents with two bedrooms or more are similar to that of single-family homes.

7. Conclusion

The COVID-19 pandemic is the first major shock to mobility on a global scale. This research focuses on the effects of the pandemic on the real estate market through specific aspects of the human mobility shock, the increase in WFH, the percentage of a minority race, and the state stringency in imposing regulations to combat the pandemic. I create and use a dataset using MSAs and state-level data spanning three years. The increases in mobility, WFH, and state stringency result in an increase in housing prices. I also find that minority-dominated neighborhoods see a decline in housing prices. I find different results with rent, as the increase in WFH does not decrease rent, meaning that the freedom to relocate and work from anywhere did not affect rental prices. I confirm the findings for housing prices using different property types and find that it follows the initial results, aside from one-bedroom properties. The findings of this paper may still be valid after the pandemic.

Although the findings of this paper have important implications for how a possible future mobility shock affects the real estate market, it is also vital to acknowledge the limitations faced when conducting this study. Macroeconomic factors, such as interest rates and inflation rates, that may have an affect on housing and rental prices were not explicitly included in the models. However, the incorporated time fixed effects in the models should absorb the partial impacts of country-level factors, and therefore the findings should remain unchanged. Another limitation is being unable to explore the change from pandemic to post-pandemic. Future research can focus on the aftermath of the pandemic and the change in housing preferences. While this study reflects that mobility is an important factor when looking at housing and rental prices, examining how a change back to normal would affect the real estate markets will be interesting. There may be a shift in migration patterns from suburbs to urban areas as the world re-opens.

While this study contributes to the literature on the affect of the pandemic on real estate, it also casts light on the change of human behavior and preferences during a mobility shock. During a state of emergency, many people made the decision to move away from dense and expensive areas due to a change in working conditions. The flexibility of working remotely pushed people to prioritize factors other than distance from the workplace.

Another contribution of this study is finding the ideal places to purchase housing during a mobility shock. If another mobility shock affects the United States at a country-wide scale, such as another pandemic, then the most profitable areas to purchase housing during the shock would be areas with higher mobility and governments that will impose stricter regulations. Areas that are darker in shades of pink and blue in figures 2 and 3 may have the highest price growth.

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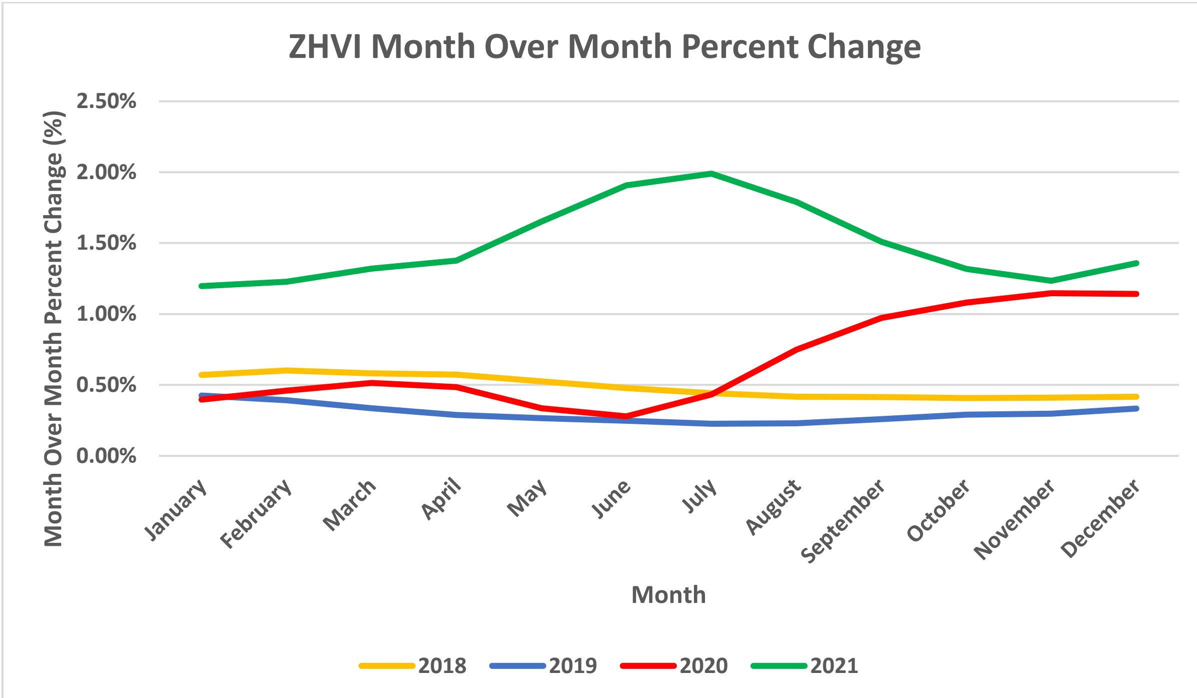

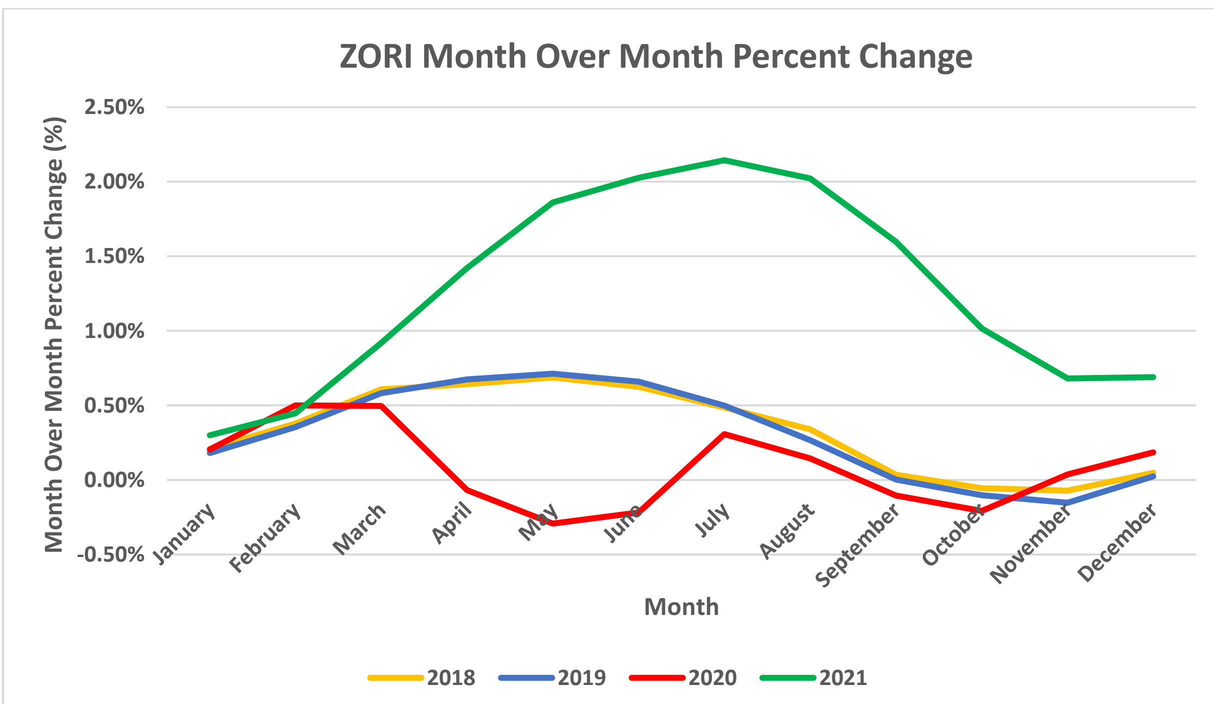

Figure 1. ZHVI and ZORI Month Over Month Percent Change
The figures present the month over month percent change in ZHVI and ZORI in the United States for the years 2018 through 2021.

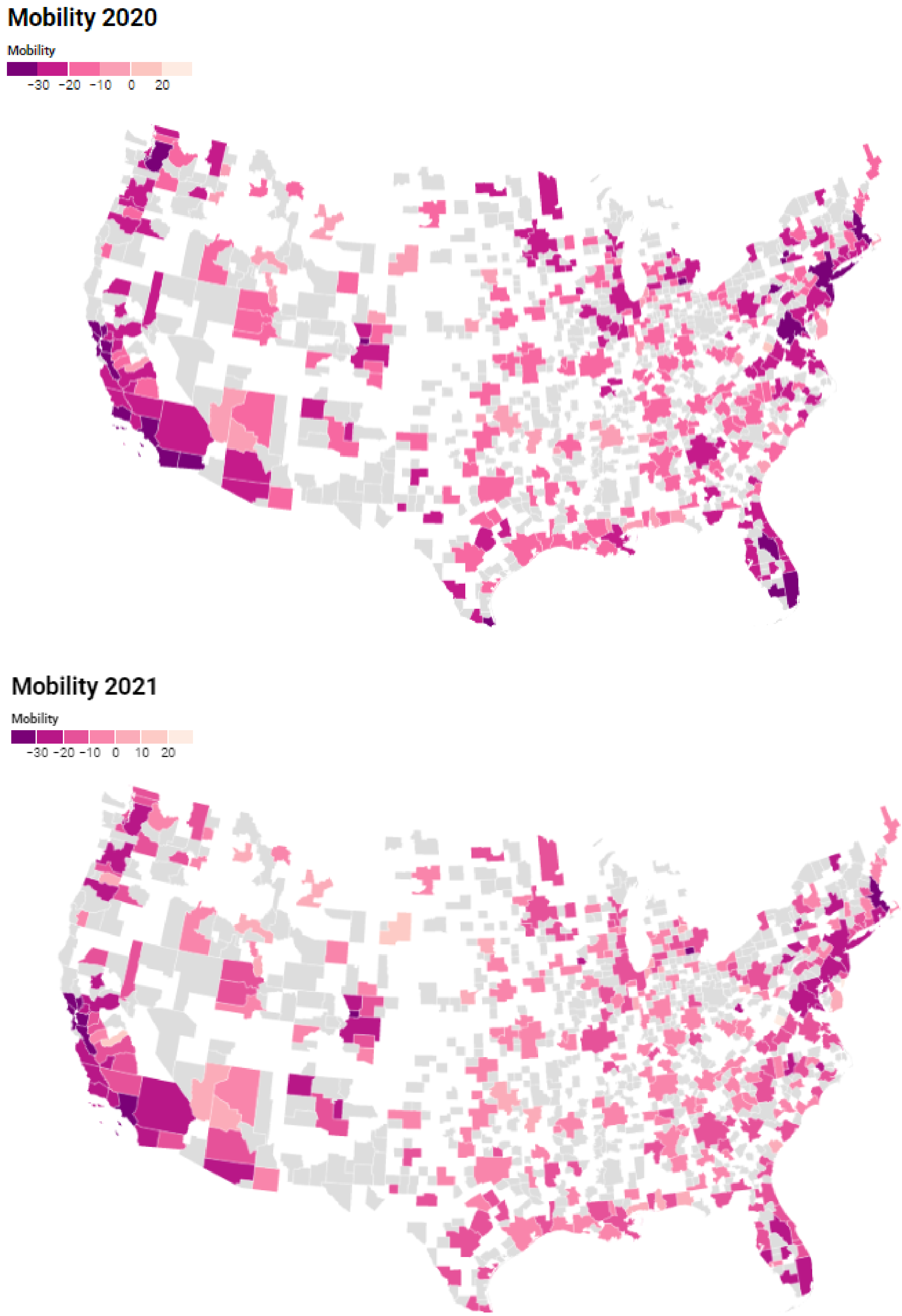

Figure 2. Mobility Change For 2020 and 2021
The figures present mobility by MSA for the years 2020 and 2021. The darker the shade of pink, the stronger the mobility decline in the MSA.

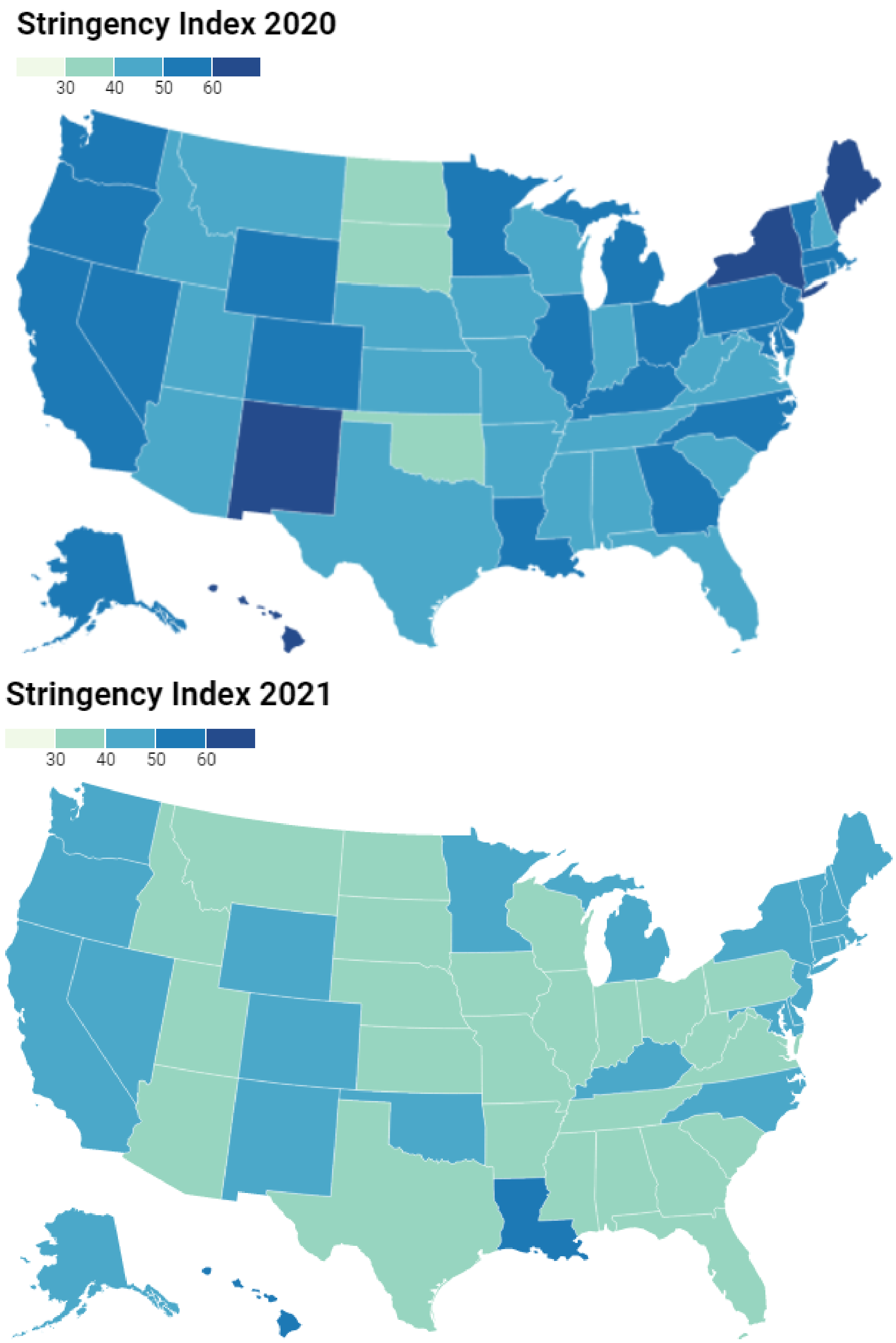

Figure 3. Stringency Index For 2020 and 2021
The figures present the Stringency Index by state for the years 2020 and 2021. The darker the shade of blue, the stricter and stronger the response of the state in issuing policies and mandates to combat the COVID-19 pandemic.

Table 1. Descriptive Statistics

Variable Names	During COVID-19					Before COVID-19					
	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max	Mean Diff.
Mobility (%)	630	-14.82	9.33	-47.16	24.31	630	0.00	0.00	0.00	0.00	
Stringency Index	630	47.23	8.42	32.98	69.29	630	0.00	0.00	0.00	0.00	
WFH (%)	628	4.61	3.01	0.70	19.02	630	2.09	0.80	0.60	6.72	2.5***
Minority Percentage (%)	630	26.03	17.36	2.80	96.00	630	25.22	17.16	2.70	96.00	0.82
Natural Logarithm of Total Household	630	11.82	1.11	10.03	15.81	630	11.78	1.11	10.02	15.79	0.0388
Income Per Capita ($ Thousands)	630	55.26	12.04	31.34	136.33	630	48.89	10.87	27.06	116.99	6374.52***
Bachelor's Degree or Higher (%)	630	30.61	8.80	11.20	63.00	630	28.75	8.42	12.90	62.10	1.86***
Unemployment Rate (%)	630	5.59	1.78	1.30	14.80	630	5.66	1.67	2.10	15.30	0.08

This table reports the descriptive statistics for the variables in the study and provides a comparison of the values for before COVID-19, the years included are 2018 and 2019, and during COVID-19, 2020 and 2021. Income Per Capital is scaled down by a factor of 1000000 to facilitate its interpretation in the regression model.

Table 2. Pearson Correlation Matrix

No.	Variable Names	1	2	3	4	5	6	7	8
1	**Mobility (%)**	1.000							
2	**Work From Home/Total Population (%)**	-0.407 (0.000)	1.000						
3	**Minority Percentage (%)**	0.013 (0.647)	-0.072 (0.011)	1.000					
4	**Stringency Index**	-0.811 (0.000)	0.392 (0.000)	0.004 (0.891)	1.000				
5	**Natural Logarithm of Total Household**	-0.155 (0.000)	0.306 (0.000)	0.164 (0.000)	0.024 (0.386)	1.000			
6	**Income Per Capita**	-0.349 (0.000)	0.561 (0.000)	-0.105 (0.000)	0.254 (0.000)	0.441 (0.000)	1.000		
7	**Bachelor's Degree or Higher (%)**	-0.225 (0.000)	0.570 (0.000)	-0.035 (0.211)	0.096 (0.001)	0.452 (0.000)	0.665 (0.000)	1.000	
8	**Unemployment Rate (%)**	-0.029 (0.312)	-0.131 (0.000)	0.223 (0.000)	-0.009 (0.754)	-0.016 (0.583)	-0.245 (0.000)	-0.401 (0.000)	1.000

This table reports the Pearson correlation matrix between the independent variables used in the regression models. The Pearson correlation coefficients are provided for each variable, and its respective p-value is under it in parenthesis.

Table 3. Pandemic Impact on ZHVI

VARIABLES	1	2	3	4	5	6	7	8
Mobility (%)					0.0173	0.00955	0.0712***	0.0637**
					(0.0284)	(0.0284)	(0.0271)	(0.0272)
WFH (%)			1.924***	1.923***			2.009***	2.000***
			(0.179)	(0.178)			(0.182)	(0.181)
Minority Percentage (%)		-0.0242***		-0.0241***		-0.0239***		-0.0223***
		(0.00828)		(0.00782)		(0.00833)		(0.00784)
Natural Logarithm of Total Household	0.00347***	0.00472***	0.00304**	0.00429***	0.00350***	0.00473***	0.00316***	0.00430***
	(0.00127)	(0.00133)	(0.00120)	(0.00126)	(0.00127)	(0.00134)	(0.00120)	(0.00126)
Income Per Capita	-0.286*	-0.284*	-0.565***	-0.563***	-0.275*	-0.277*	-0.531***	-0.532***
	(0.150)	(0.149)	(0.144)	(0.143)	(0.151)	(0.150)	(0.144)	(0.143)
Bachelor's Degree or Higher (%)	0.0152	0.00788	-0.104***	-0.112***	0.0170	0.00892	-0.102***	-0.109***
	(0.0210)	(0.0210)	(0.0227)	(0.0227)	(0.0212)	(0.0213)	(0.0227)	(0.0227)
Unemployment Rate (%)	0.102	0.210**	0.139*	0.245***	0.110	0.213**	0.174**	0.269***
	(0.0867)	(0.0938)	(0.0819)	(0.0886)	(0.0877)	(0.0944)	(0.0827)	(0.0890)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	944	944	944	944	944	944	944	944
Adjusted R-squared	0.622	0.625	0.663	0.666	0.622	0.625	0.666	0.668

The table presents the regression results for the mobility, WFH, and Minority Percentage, on ZHVI. All independent variables are lagged by one year. Variable descriptions are as in Table 1. Income Per Capital is scaled down by a factor of 1000000 to facilitate its interpretation in the regression model. The regressions include year-fixed effects. Standard errors are reported in parentheses. Significance is indicated as follows: *p<0.1; ** p<0.05; *** p<0.01.

Table 4. Pandemic Impact on ZORI

VARIABLES	1	2	3	4	5	6	7	8
Mobility (%)					0.249**	0.226**	0.259**	0.234**
					(0.111)	(0.112)	(0.113)	(0.114)
WFH (%)			0.00846	0.00691			0.335	0.302
			(0.744)	(0.743)			(0.756)	(0.755)
Minority Percentage (%)		-0.0769**		-0.0769**		-0.0705**		-0.0702**
		(0.0324)		(0.0324)		(0.0325)		(0.0325)
Natural Logarithm of Total Household	-0.0127**	-0.00877*	-0.0127**	-0.00877*	-0.0122**	-0.00864*	-0.0123**	-0.00870*
	(0.00496)	(0.00522)	(0.00497)	(0.00522)	(0.00495)	(0.00521)	(0.00496)	(0.00521)
Income Per Capita	0.328	0.335	0.327	0.334	0.489	0.480	0.447	0.442
	(0.582)	(0.581)	(0.593)	(0.591)	(0.586)	(0.584)	(0.594)	(0.593)
Bachelor's Degree or Higher (%)	-0.265***	-0.288***	-0.265***	-0.289***	-0.239***	-0.263***	-0.259***	-0.281***
	(0.0819)	(0.0823)	(0.0940)	(0.0943)	(0.0825)	(0.0830)	(0.0938)	(0.0942)
Unemployment Rate (%)	-0.145	0.196	-0.145	0.196	-0.0292	0.272	-0.0186	0.280
	(0.338)	(0.366)	(0.338)	(0.366)	(0.341)	(0.367)	(0.342)	(0.368)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	930	930	930	930	930	930	930	930
Adjusted R-squared	0.114	0.118	0.113	0.117	0.118	0.121	0.117	0.120

The table presents the regression results for the mobility, WFH, and Minority Percentage, on ZORI. All independent variables are lagged by one year. Variable descriptions are as in Table 1. Income Per Capital is scaled down by a factor of 1000000 to facilitate its interpretation in the regression model. The regressions include year fixed effects. Standard errors are reported in parentheses. Significance is indicated as follows: *p<0.1; ** p<0.05; *** p<0.01.

Table 5. Pandemic Impact on ZHVI and ZORI including the Stringency Index

VARIABLES	ZHVI (1)	ZHVI (2)	ZORI (1)	ZORI (2)
Mobility (%)		0.108***		0.277**
		(0.0295)		(0.124)
WFH (%)		1.982***		0.280
		(0.180)		(0.756)
Minority Percentage (%)		-0.0199**		-0.0680**
		(0.00781)		(0.0326)
Stringency Index	0.137***	0.155***	0.00995	0.153
	(0.0407)	(0.0419)	(0.161)	(0.175)
Natural Logarithm of Total Household	0.00349***	0.00428***	-0.0127**	-0.00872*
	(0.00126)	(0.00125)	(0.00496)	(0.00521)
Income Per Capita	-0.342**	-0.563***	0.324	0.412
	(0.150)	(0.143)	(0.586)	(0.594)
Bachelor's Degree or Higher (%)	0.0121	-0.107***	-0.265***	-0.278***
	(0.0209)	(0.0226)	(0.0820)	(0.0942)
Unemployment Rate (%)	0.0493	0.218**	-0.149	0.231
	(0.0877)	(0.0894)	(0.343)	(0.373)
Constant	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	944	944	930	930
Adjusted R-squared	0.626	0.672	0.113	0.120

The table presents the regression results for the mobility, WFH, Minority Percentage, and the Stringency Index on ZHVI and ZORI. All independent variables are lagged by one year. Variable descriptions are as in Table 1. Income Per Capital is scaled down by a factor of 1000000 to facilitate its interpretation in the regression model. The regressions include year fixed effects. Standard errors are reported in parentheses. Significance is indicated as follows: *p<0.1; ** p<0.05; *** p<0.01.

Table 6. Pandemic Impact on ZHVI by Property Type

Panel A - Single Family Homes

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Mobility (%)					0.00489	-0.00313	0.0587**	0.0509*		0.0950***
					(0.0285)	(0.0285)	(0.0273)	(0.0273)		(0.0297)
WFH (%)			1.937***	1.936***			2.007***	1.997***		1.979***
			(0.180)	(0.179)			(0.183)	(0.182)		(0.181)
Minority Percentage (%)		-0.0245***		-0.0244***		-0.0246***		-0.0230***		-0.0206***
		(0.00832)		(0.00785)		(0.00837)		(0.00788)		(0.00785)
Stringency Index									0.144***	0.154***
									(0.0409)	(0.0422)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	944	944	944	944	944	944	944	944	944	944
Adjusted R-squared	0.625	0.628	0.666	0.669	0.624	0.627	0.667	0.670	0.629	0.674

Panel B - One Bedroom

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Mobility (%)					0.0654*	0.0701*	0.0670*	0.0720*		0.0854**
					(0.0381)	(0.0382)	(0.0387)	(0.0389)		(0.0424)
WFH (%)			-0.0152	-0.0133			0.0644	0.0725		0.0675
			(0.257)	(0.257)			(0.260)	(0.260)		(0.260)
Minority Percentage (%)		0.0130		0.0130		0.0149		0.0150		0.0157
		(0.0112)		(0.0112)		(0.0112)		(0.0112)		(0.0113)
Stringency Index									-0.00395	0.0473
									(0.0548)	(0.0600)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	912	912	912	912	912	912	912	912	912	912
Adjusted R-squared	0.432	0.432	0.431	0.431	0.433	0.433	0.432	0.433	0.431	0.432

	Panel C - Two Bedrooms									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Mobility (%)					0.0892***	0.0835***	0.140***	0.135***		0.186***
					(0.0316)	(0.0317)	(0.0308)	(0.0309)		(0.0336)
WFH (%)			1.739***	1.738***			1.907***	1.900***		1.880***
			(0.205)	(0.204)			(0.206)	(0.206)		(0.204)
Minority Percentage (%)		-0.0199**		-0.0198**		-0.0175*		-0.0160*		-0.0133
		(0.00929)		(0.00895)		(0.00930)		(0.00891)		(0.00888)
Stringency Index									0.110**	0.178***
									(0.0457)	(0.0477)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	944	944	944	944	944	944	944	944	944	944
Adjusted R-squared	0.559	0.560	0.590	0.592	0.562	0.563	0.598	0.599	0.561	0.605

	Panel D - Three Bedrooms									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Mobility (%)					0.0146	0.00789	0.0668**	0.0604**		0.101***
					(0.0281)	(0.0282)	(0.0270)	(0.0270)		(0.0294)
WFH (%)			1.869***	1.868***			1.949***	1.941***		1.924***
			(0.178)	(0.177)			(0.180)	(0.180)		(0.179)
Minority Percentage (%)		-0.0207**		-0.0206***		-0.0205**		-0.0189**		-0.0168**
		(0.00822)		(0.00777)		(0.00826)		(0.00780)		(0.00778)
Stringency Index									0.125***	0.141***
									(0.0404)	(0.0418)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	944	944	944	944	944	944	944	944	944	944
Adjusted R-squared	0.632	0.634	0.670	0.672	0.631	0.633	0.672	0.674	0.635	0.677

	Panel E - Four Bedrooms									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Mobility (%)					-0.0113	-0.0210	0.0426	0.0331		0.0711**
					(0.0281)	(0.0280)	(0.0268)	(0.0268)		(0.0291)
WFH (%)			1.959***	1.958***			2.010***	1.998***		1.983***
			(0.177)	(0.175)			(0.179)	(0.178)		(0.177)
Minority Percentage (%)		-0.0290***		-0.0289***		-0.0296***		-0.0279***		-0.0259***
		(0.00818)		(0.00768)		(0.00822)		(0.00772)		(0.00771)
Stringency Index									0.138***	0.133***
									(0.0403)	(0.0414)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	944	944	944	944	944	944	944	944	944	944
Adjusted R-squared	0.641	0.645	0.682	0.687	0.641	0.645	0.683	0.687	0.645	0.690
	Panel F - Five or More Bedrooms									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Mobility (%)					-0.00851	-0.0170	0.0484*	0.0402		0.0798***
					(0.0287)	(0.0287)	(0.0273)	(0.0273)		(0.0297)
WFH (%)			2.064***	2.064***			2.123***	2.112***		2.096***
			(0.180)	(0.179)			(0.183)	(0.182)		(0.181)
Minority Percentage (%)		-0.0256***		-0.0255***		-0.0261***		-0.0243***		-0.0222***
		(0.00837)		(0.00784)		(0.00841)		(0.00787)		(0.00785)
Stringency Index									0.140***	0.139***
									(0.0412)	(0.0422)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	944	944	944	944	944	944	944	944	944	944
Adjusted R-squared	0.643	0.646	0.687	0.690	0.642	0.646	0.687	0.690	0.647	0.693

The table presents the regression results for the year over year change in ZHVI by the type of property for the period between 2019 to 2021, for lagged mobility, WFH, Minority Percentage, and the Stringency Index. All models include control variables, year fixed effects, and a constant. Variable descriptions are as in Table 1. Income Per Capital is scaled down by a factor of 1000000 to facilitate its interpretation in the regression model. Standard errors are reported in parentheses. Statistical significance is denoted by: * $p<0.1$; ** $p<0.05$; *** $p<0.01$.