

## Mortality Rates effect on Housing Prices

### The Question

The correlation between county-level per-capita Covid-19 mortality rates in 2020 and housing prices in 2021 is an important topic for real estate professionals, investors, and policymakers. With the pandemic impacting various facets of the economy, it is essential to determine how Covid-19 has affected the real estate market, particularly housing prices, which are a key barometer of market health.

Real estate businesses and investors can utilize the data to make informed decisions on portfolio management and investment strategies. By understanding how the pandemic has affected demand for housing in different areas, stakeholders can identify profitable opportunities, avoid potential risks, and optimize their investments.

Moreover, policymakers can use the findings to implement targeted interventions aimed at supporting the real estate market and promoting economic recovery. If the data shows a significant impact of Covid-19 on housing prices, policymakers can consider measures such as targeted stimulus packages or other policies to boost demand for housing in affected areas.

### Used Data

As part of my task to answer a critical question, I had to gather data from multiple sources and merge them into a final analysis dataset. The first data source I used was county-level Covid-19 mortality data, which I accessed from The New York Times. They had compiled data on Covid-19 cases and deaths at the county-day level, which I needed to aggregate to mortality for the year 2020.

In order to convert raw mortality numbers to per-capita mortality rates, I also needed data on each county's population. I obtained this data from the U.S. Census Bureau, which maintains population data for each county. This data helped me calculate the per-capita mortality rates for each county, which was an important factor in my analysis.

Another data source I used was ZIP-level housing price data, which I accessed from the Federal Finance Housing Agency (FHFA). They maintain housing price indices at the ZIP (3-digit) level over many years, which I needed to determine the impact of housing prices on mortality rates. Finally, to aggregate the ZIP-level data to the county level, I used a ZIP-county crosswalk, which I obtained from the U.S. Department of Housing and Urban Development's Office of Policy Development and Research's website. This data helped me match each ZIP code to its corresponding county, which was necessary for my analysis.

I then used STATA to clean each of these data sets, dropping variables, combining sets, and merging files to be able to more fully work with the DATA to run the actual analysis. I also bridged ZIP codes into

## Analysis

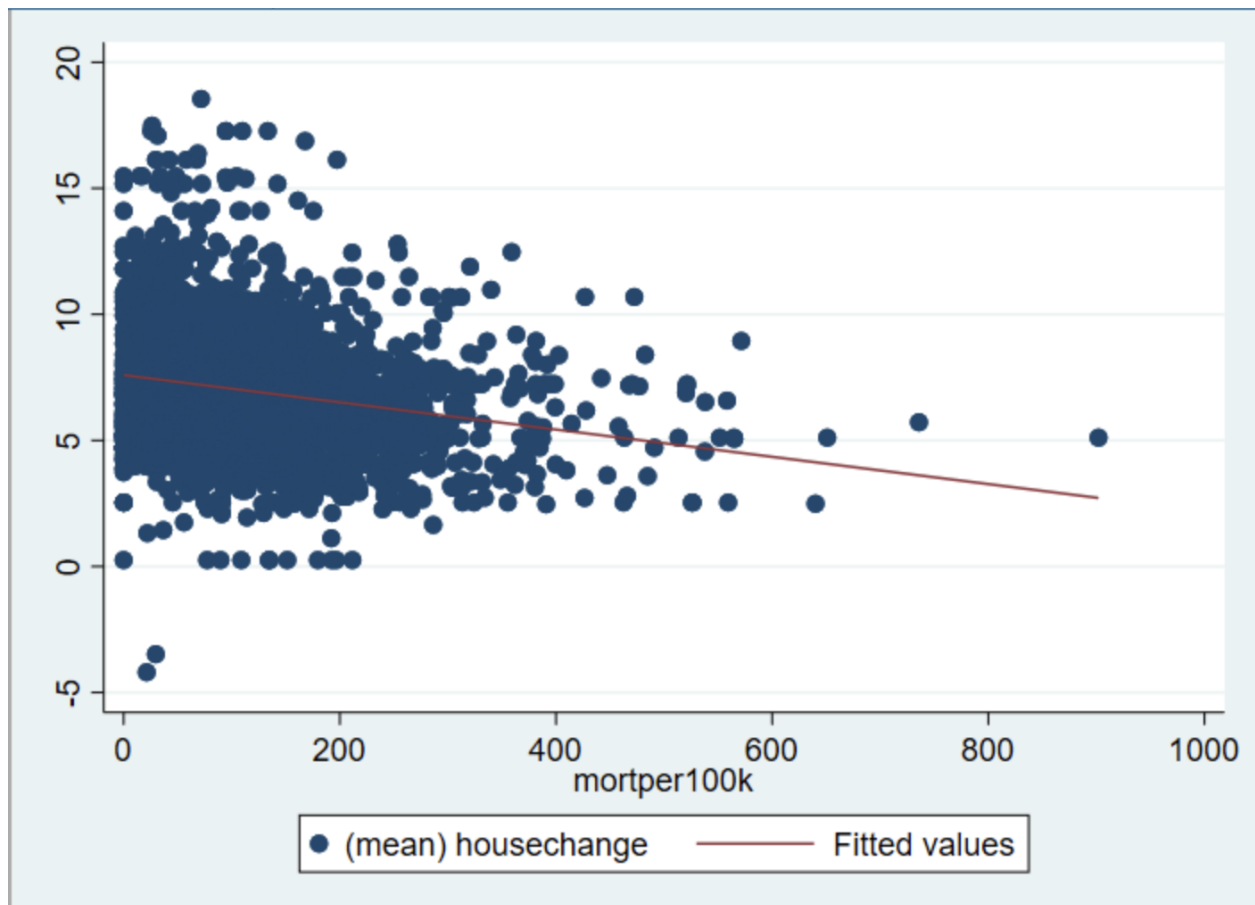
The specific regression model that we use in this analysis is as follows:  $\text{housechange}_i = \beta_0 + \beta_1 \log(\text{mortper100k})_i + \beta_2 \log(\text{avgwage})_i + \beta_3 \text{wagechange}_i + u_i$  ...where  $\text{housechange}_i$  represents a given county's percent change in HPI from 2020 to 2021,  $\log(\text{mortper100k})_i$  represents that county's COVID-19 mortalities per one hundred thousand residents in 2020,  $\log(\text{avgwage})_i$  represents that county's average weekly wage in 2021,  $\text{wagechange}_i$  represents that county's percent change in average weekly wage from 2020 to 2021,  $u_i$  represents an error term that accounts for all variation in  $\text{housechange}_i$  not measured by those variables, and the beta coefficients  $\beta_i$  represent the effect of a one unit increase of a given variable on  $\text{housechange}_i$ .

In order to control for other factors, such as inflation and regional differences in wealth, among others, we use an ordinary least squares regression model with several independent variables. This allows us to determine the strength of the relationship between housing prices and COVID-19 mortality rates while also controlling for things like overall inflation and regional differences. The individual COVID-19 mortality rate of any given county cannot completely account for a change in that county's overall housing prices. This model relies on a number of assumptions, such as that measures of county wages and changes in wages do a good job of controlling for overall inflation and regional differences in county wealth. We argue that controlling for average weekly wage allows our model to adequately capture the effects of living in a poorer or richer region of the country without needing to explicitly specify those regions. We also argue that controlling for year-on change in average weekly wage allows our model to adequately capture the effects of inflation and COVID-related labor market adjustments, sufficiently isolating the effect of COVID-19 mortality rates on changes in housing prices from other outside influences to allow for causal analysis. Running the above-specified regression with standard robustness checks returned the following:

Variable	Coefficient	Std. Error
<i>log(avgwage)</i>	-0.64	0.055
<i>wagechange</i>	0.031	0.253
<i>log(mortper100k)</i>	-0.69	0.011
<i>_constant</i>	14.36	1.754

Our regression analysis not only provides us with coefficients for each variable but also enables us to forecast the change in housing prices in a specific county when we have data on its other

variables. This enables us to generate predictions and depict them graphically alongside our individual data points, as illustrated in the image below:



Our regression analysis reveals a potential causal link between COVID-19 mortality rates in a county and its housing price changes. Our findings suggest that counties with higher mortality rates experienced a smaller increase in housing prices compared to those with lower rates. This may indicate that there was lower demand for housing in high mortality rate counties due to workers moving to areas with lower rates.

However, one possible limitation of our study is that we did not account for population density, which may have inflated the effect of COVID-19 mortality rates on housing prices. Nonetheless, our interpretation may still hold true if we consider that displaced workers may have sought less crowded living in rural areas, leading to lower COVID-19 mortality rates in those areas.

In summary, our regression analysis suggests that COVID-19 mortality rates may have played a role in shaping housing prices in 2020-2021. Further research is needed to

confirm our findings and explore the relationship between population density and COVID-19 mortality rates in this context.