

Affordable Housing Availability

Introduction

The need for cheap and affordable housing for the lower class has always been an issue and is continuing to be an issue up to today. The US government has subsidized housing to help these lower income families and people in all states. In order to qualify, you must prove you are below a certain income threshold and then become eligible for subsidized housing prices. As a student who is married, my wife is expecting, and we are looking to move, this particular question has been on my mind as I have been searching for new housing under our small income. I wanted to know how the percent of affordable housing units to non-affordable housing units has changed over the recent years. That is to say, what percent of the number of housing locations out there are part of the affordable housing program? And is there evidence to show that the percent of affordable housing units has decreased in recent years?

By answering this question one could better understand the trend of affordable housing and expect to possibly have more or less in the future, although this would be extrapolation and thus risky. This information could also be used in a case to a government official to push for more or less affordable housing depending on the results and the agenda.

Methods

The data used in this project is data from Connecticut found on data.gov, actual link: <https://catalog.data.gov/dataset/affordable-housing-by-town-2011-present>. The years 2011 to 2016 are covered within this dataset so the year 2011 will be compared to the year 2016 to see if there are any significant changes with the percent of available government subsidized housing. The distribution chosen to represent this parameter, θ , as a likelihood is the Beta distribution. The Beta distribution makes logical sense as our parameter of interest will always be a number between 0 and 1, just where the Beta distribution has its range. For this study, the parameters of interest are the number of houses sampled, α , and the number of houses within the houses sampled that were found to be under government subsidy, β . In order to make a good prior, the data from 2012 to 2015 was used to make a prior $\text{Beta}(125, 1000)$. This distribution works well as a prior since it was based on the mean from years 2012 to 2015, also from the dataset. The seemingly larger values of 125 and 1000 will not be that significant as the variables of interest are 10x these values, meaning that while the prior has some effect on the

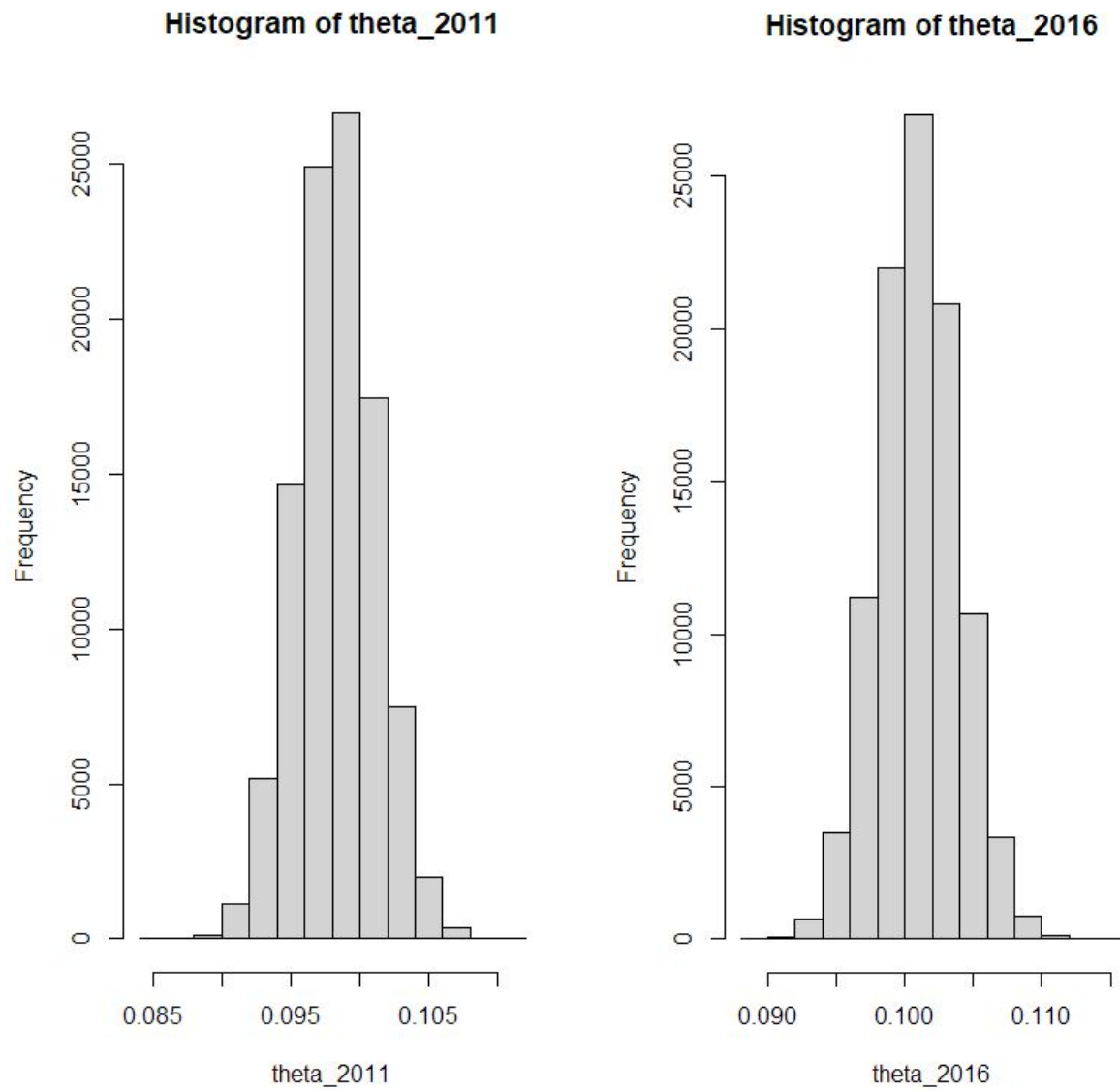
Michael Pixton

12/10/2020

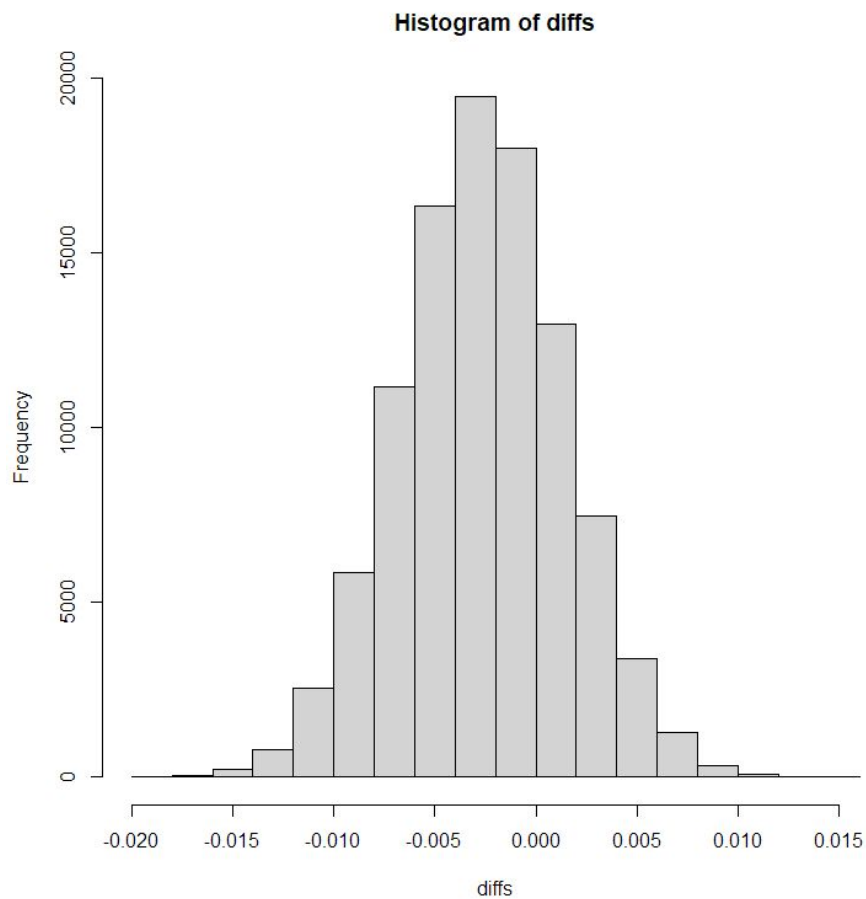
posterior, it will not dominate the posterior distribution. Using the posterior distribution of years 2011 and 2016, we can compare and then subtract them to create a new distribution for 2011 - 2016. This distribution will then lead us to better understand if the percent of affordable housing has changed significantly from 2011 to 2016.

Results

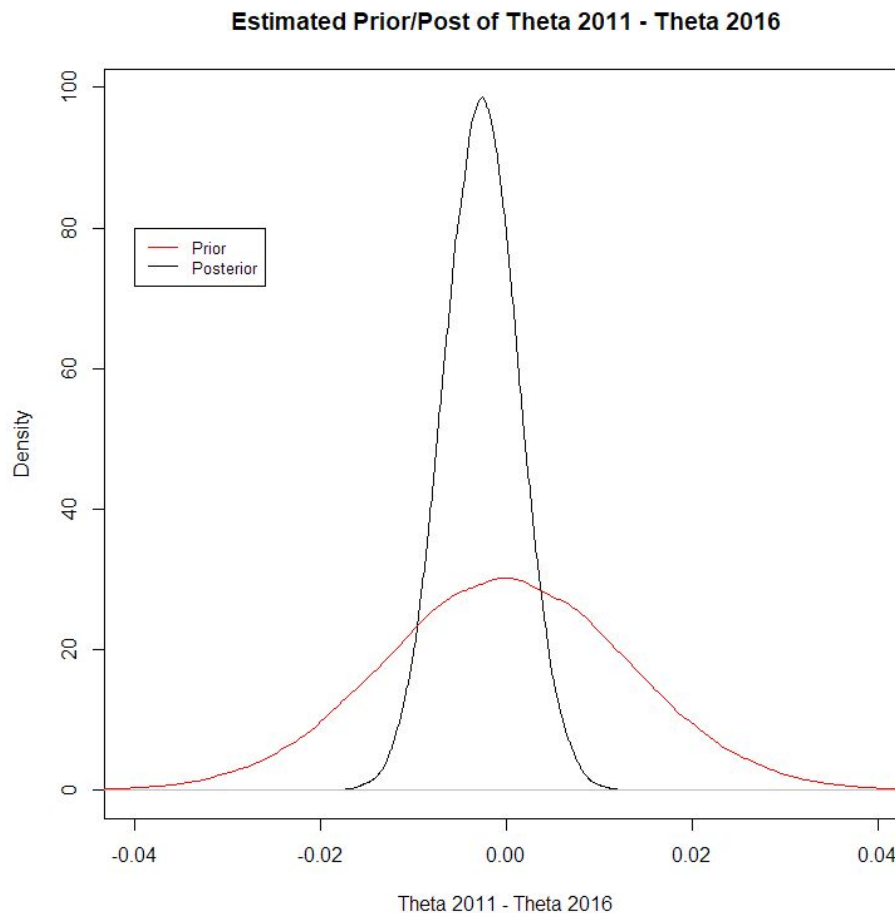
The 2011 year produces a posterior distribution of $\text{Beta}(1068, 9804)$ while 2016 produced a posterior of $\text{Beta}(1101, 8804)$. Using Monte Carlo sampling, Year 2011 shows that mean for theta to be .098 and the Year 2016 shows that mean for theta to be .101. Histograms of these posterior distributions are below.



The difference of 2011 - 2016 histogram is next.



Now, the percent of differences showing that 2011 had a higher theta is only .256 and the 95% confidence interval for theta 2011- 2016 was found to be between -.011 and .005. This means that the true value for theta 2011 - 2016 lies within these bounds with a degree of 95% confidence. Finally, a graph was produced to compare the prior and posterior of the differences between 2011 and 2016 side by side.



Discussion

With only .256 of difference of 2011 - 2016 being positive, this indicates that the percent of government subsidized housing has more likely increased, rather than decreased from 2011 to 2016. And then the credible interval contains the number, and it is not even right on the edge; we thus can conclude that there has been no significant change in the percent of government subsidized housing units from 2011 to 2016. We can also conclude that the percent of subsidized housing in Connecticut is right around 10% after this study with both 2011 and 2016's means for theta being within less than a 1/5 of a percent from 10%.

It would have been better for the question to have found data in Utah but I searched and that data was not as easily available. Connecticut does as a generalization, however, the results in

Michael Pixton

12/10/2020

the study are specific to Connecticut. More current data would be more useful as well but again was not found to be available.

More studies in different states and well as different time periods could produce different results and would allow us to better understand how much of the current housing market is government subsidized housing and whether or not that value is changing.