GEOGRAPHIC REGION PLAYS NO ROLE IN UPWARD MOBILITY IN WEALTH IN THE U.S.

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Preface

After receiving feedback and reflecting on my paper, I came to the conclusion that its introduction, methods, and results needed the most revision. The goal of the revisions was to ensure the paper as a whole was easier to read and understand for the audience. For example, in the introduction, it was not clear where the data was collected from and was not consistent with terminology such as 'census region'. For methods, I was giving a play by play description of how the data was analyzed, which isn't of much value to the readers. I tried to change that and only include information that helped the reader understand the paper holistically. The language was also changed to make it concise and clear for the audience. For the results, the paper originally contained plots that were very small in size and difficult to read. In order to make it easier for the audience, the plots were updated to make the axes more readable. A short description was also added to each plot to make it easier for the audience to understand what information each plot was conveying. All of these revisions all shared the goal of optimizing the audience's reading experience.

Introduction

Economic mobility is a topic of great interest in the United States. In the recent past, wide interest among the young voters of the United States has been related to the top 1% getting richer, while the rest are stuck in poverty. This has been a key political campaign topic for the US election since Bernie Sanders brought this to the forefront of his election campaign, generating wide interest within the voter base.

The ability for people to move from a lower-income class to a higher income class is called upward mobility. The question we have addressed through this research paper is whether the four census regions of the United States, that this study was conducted on, differ in upward social mobility. The data is from a sample of 40 commuting zones which are 40 labor markets within the census regions of the United States. This data was collected from the tax returns of the people in these census regions. The division into 40 commuting zones is a way to delineate local economies. This data included information related to the name of the state, the census region that the state belongs to, the sample size, the population size of the zone, and the upward mobility proportion. In order to better answer the research question, this data was analyzed to first construct the confidence intervals and later used results to compare and better understand the overall picture of upward mobility in the United States(1).

All census regions have the same upward mobility. Further analysis would help understand why Northeast and West census regions, despite having more job opportunities, still isn't ahead of the other census regions for upward mobility.

Methodology

To analyze the data from the 40 zones, sample of individuals born around 1980-1982, who have been living in the commuting zone at sixteen with household income of the lowest quintile of the US household incomes during that time was used (1). The same individual's income during 2010 was visited back to see the upward mobility and measure increase in income for these individuals. The samples were collected uniformly at random. As only a limited number of commuting zones were selected, and since individuals were selected only when their commuting zones are selected, at the level of the state, region or country one did not have a simple random sample.

The sample data was obtained through several methods and different sampling techniques. Data was collected from ten commuting zones of each of the four regions in the United States; the West, Midwest, Northeast, and South. The sizes of sub-samples within selected commuting zones were designated in such a way that within each of the four regions (Midwest, Northeast, South and West), each member of the targeted 1980-82 cohort had the same overall probability of selection into the sample. At the level of census regions, sampling was done so as to net regional samples of roughly equal size.

In order to construct the 95% confidence intervals, the Agresti-Coull interval was used for each of the forty commuting zones. This interval was chosen over the standard interval since the sample proportions are less than thirty and often times close to zero. The Agresti-Coull interval also provided a good coverage probability and wasn't extremely difficult to implement for our analysis (2).

The Agresti-Coull intervals coverage probability is less fluctuating when p is close to 0. The interval provides a good minimum coverage, even when p value is very close to 0. Furthermore, the length of the interval is also considerable larger than that of the of Wilson intervals when the sample size is similar to the given sample size (which is thirty or less). The ease of implementation was also a big factor of using the Agresti-Coull interval.

In order to tackle the question of how regions relate to the upward mobility of people, proportions of the sample were calculated for each region. Then, the likelihood ratio test was conducted to test the null hypothesis that the upward mobility is the same across the four regions. This test was chosen because we wanted to test multiple proportions at once, which made our analysis easier, more efficient and more accurate.

Results

The Confidence Intervals of the sample data for each of the regions is visually represented below in Figure 1.

Figure 1: *Upward Mobility Confidence Intervals in the U.S.*
(a) West (b) South (c) Northeast (d) Midwest

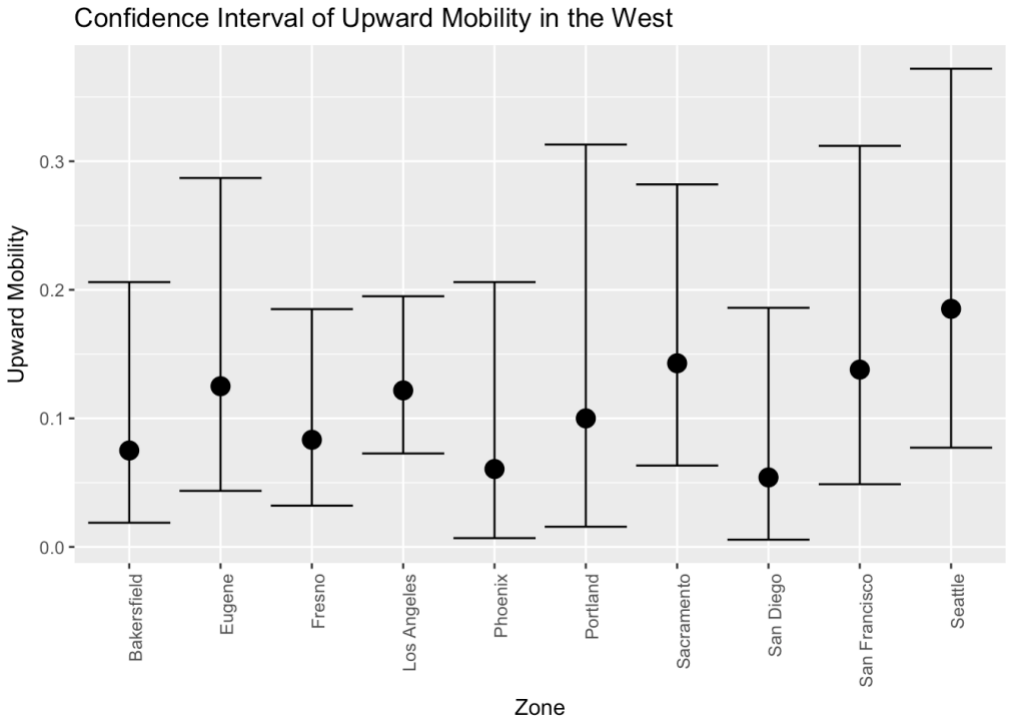

Figure 1(a)

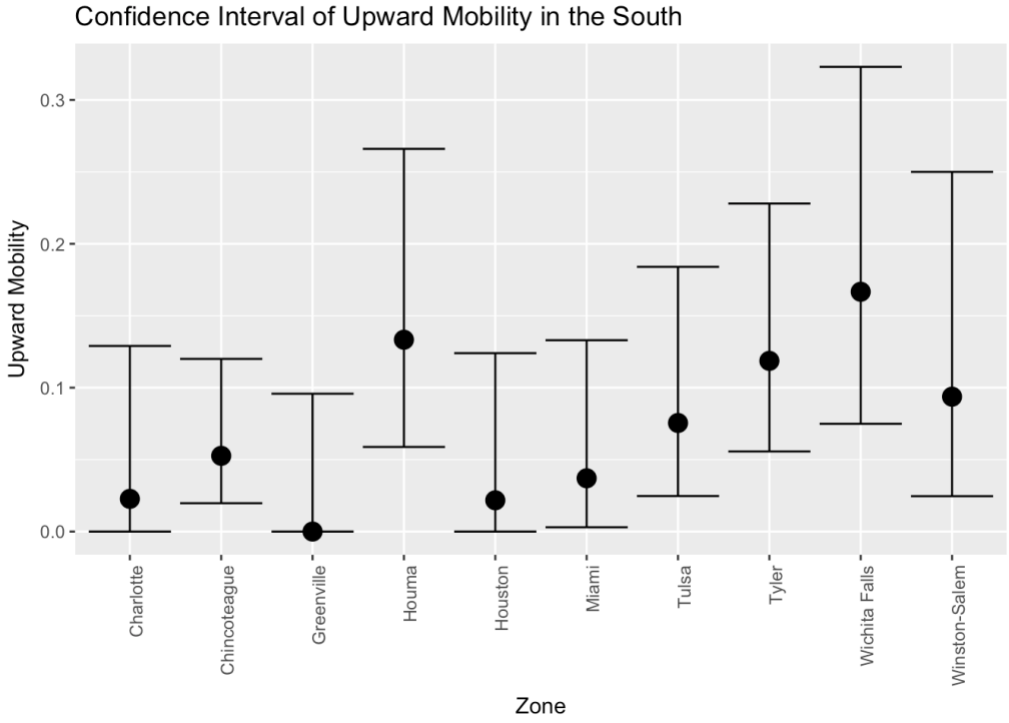

Figure 1(b)

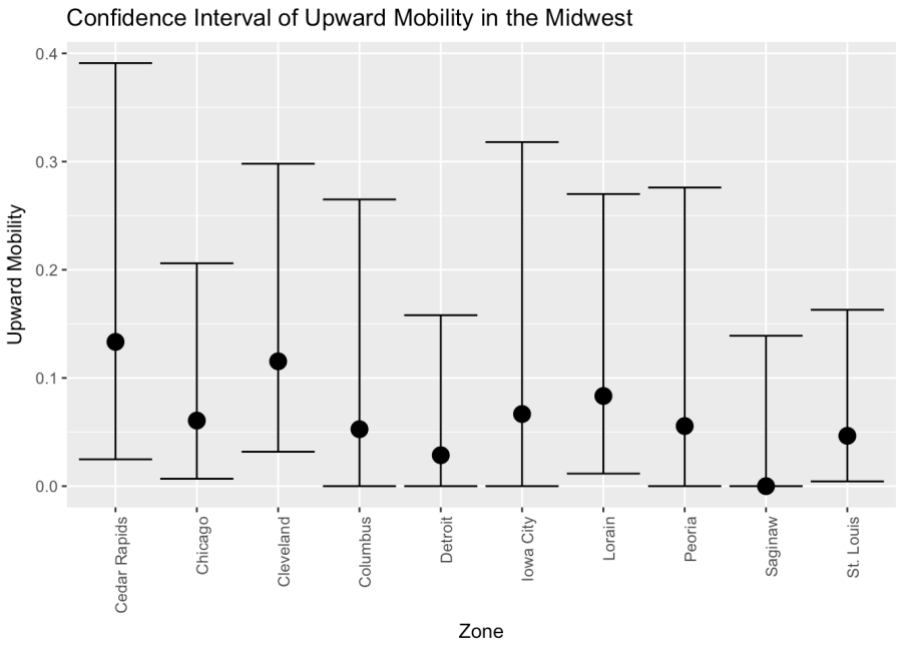

Figure 1(c)

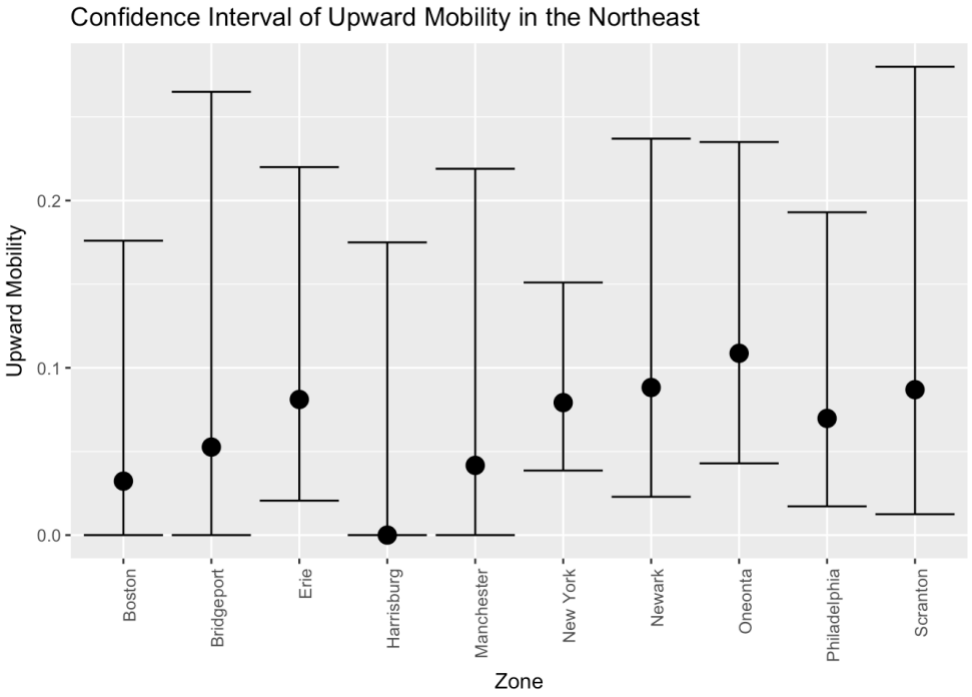

Figure 1(d)

For the likelihood ratio test, we first calculated the Upward Mobility Proportions (UMP) for each region. From the calculations, we found that the West has a UMP of 0.1080, Midwest has a UMP of 0.5836, the Northeast has a UMP of 0.0711 and the South has a UMP of 0.0689. Upon using the likelihood test ratio, we find that the upward mobility probability was the same across the four regions based, which means the null hypothesis wasn't rejected. A visual representation of these are shown below in the form a side-by-side boxplot.

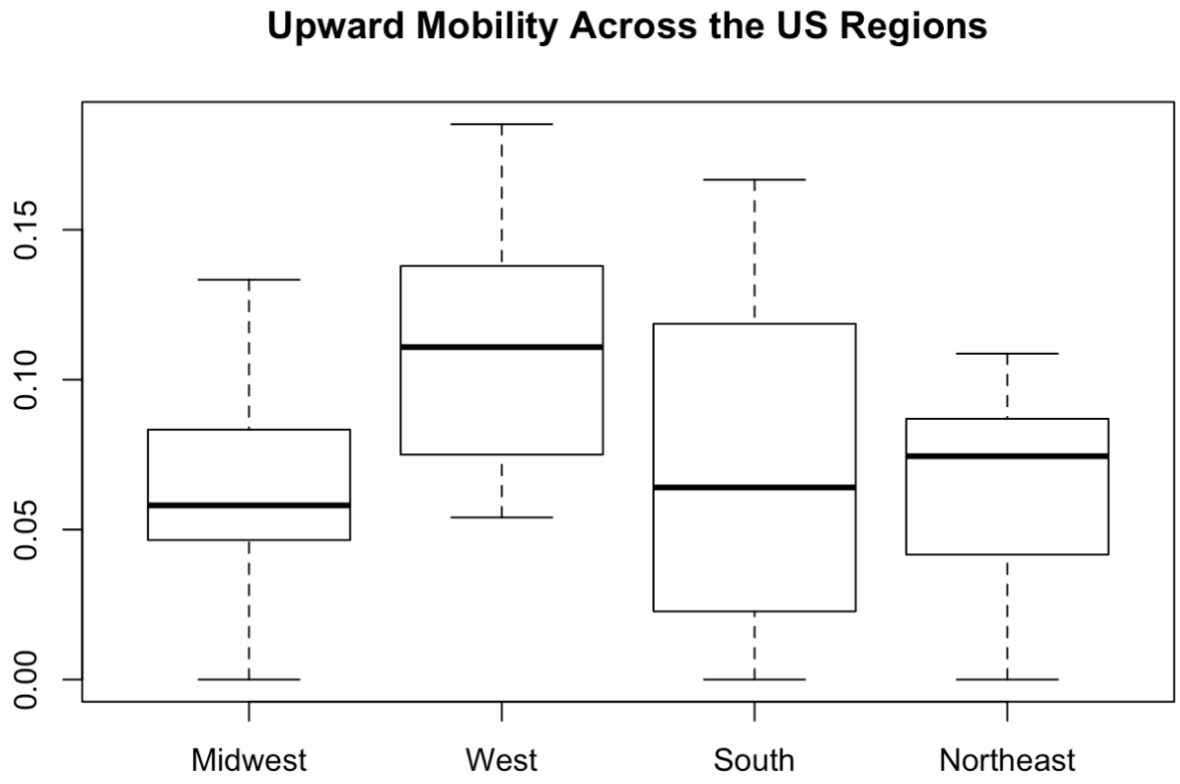

Fig 2: Side-by-side plot of the Upward Mobility Proportion for the Midwest, West, Midwest, South and Northeast

Discussion

One of the possible shortcomings of this study is the dissimilar population sizes of the each of the regions. This is important to note because our findings show that the upward

mobility is the same across the regions; which is rather surprising for a country like the United States, where opportunities aren't the same across the region. Particularly, the West and Northeast would be expected to have a higher upward mobility but that doesn't seem to be the case. This could've been due to our sampling technique. For instance, the sample size of he West and Midwest were similar, while the Northeast was 20% smaller and the South was 50% larger. Hence, it's accurate to say that the forty zones' sample data was not accurately representative of the population data. This, however, could be improved by sampling according to the population proportion for each region. A better representative sample may have given us different results but would be too early to comment on that.

Another limitation of the study may have been the choice of the confidence interval that was used. The Agresti-Coull interval is conservative for proportions close to 0, despite having a good minimum coverage. This may have cause certain shortcomings in terms of coverage, but the trend was still evident across all the zones. It would be interesting to analyze this study through the lens of a different interval to see if it's consistent.

Overall, the study shows that the upward mobility across the census regions are not different. This is important to note as it helps dispel common belief that certain census regions may be better than others to help residents of the region move up in wealth. Further research on upward mobility is also needed to better understand the causes and correlations for this very important issue.

References

(1) Hansen, B. (2018). Unit 1 Paper 1, Version 1. Stats 485: Capstone Seminar. https://umich.instructure.com/courses/273641/assignments/695449

(2) Brown, L.D., Cai, T.T., DasGupta, A. (2001). Interval Estimation for a Binomial Proportion. *Statistical Science.*