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Income Inequality and Workplace Mobility During the COVID-19 Pandemic

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Income Inequality and Workplace Mobility During the COVID-19 Pandemic

Honors Thesis in Economics

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Abstract:

With the pandemic being a once in a lifetime event (hopefully), there are many areas of research with purpose that were impossible to research beforehand. This paper looks at how income inequality created a separation between the rich and the poor regarding work and residential movement during the pandemic in the United States. By taking work and residential movement data from the Google Mobility report, which measures movement during the pandemic as a percent change benchmarked against pre pandemic movement and correlating it to the logarithm of Gross domestic product per capita, the effects of income can be seen. By doing this for every county in the US, I am able to see how richer and poorer counties moved during the pandemic. The results show that a 1 percent increase in gross domestic product lead to a 21 percent decrease in work movement, and a 31 percent increase in residential movement. This insinuates that poor counties were more likely to work in person, and less likely to be home. Because of the pandemic, this means the poor were more likely to be at risk of COVID-19 exposure. This is likely due to the types of jobs held by the poor and a lack of accumulated wealth which would have allowed them to take time off. In conclusion our country was punishing the poor, by increasing the chances of getting covid, while the rich were able to stay safe.

Introduction:

Income inequality is the uneven distribution of wealth within a population or area. (Inequality.org, 2021) Income inequality is a product of a capitalistic society. There will always be those who earn more than others. However, income inequality has been increasing at an alarming rate in the US, meaning that the rich are getting richer while the poor are left in the dust. This leads to a society where the poor have worse health, worse public goods, and worse social environments compared to the rich. (Inequality.org, 2021) This creates a compounding effect, where the poor will continue to be worse off, as they do not have the same resources as the rich, such as education and healthcare. The top 1 percent of wealthy individuals in the US have doubled their income since 1970, while the poverty rate has stayed the same. (Inequality.org, 2021) For a country to be progressing efficiently, it should be supporting all members of society.

Income inequality is a problem for a society because it means that certain demographics of a society are better off solely because of their income. It leads to economic inefficiencies, that are avoided in a more equitable society. For example, income inequality is proven to decrease life expectancy. (Inequality.org, 2021) This is due to the poor having less money to take care of their health; they cannot afford to visit the doctor every time something feels wrong or purchase high quality foods and medicines that improve health. This lowers their utility and productivity, which in turn will lower the economic impact on society. By decreasing the income inequality gap, and improving the livelihood of the poor, it will improve the productivity of our economy.

Another important example is that income inequality leads to worse education for the poor. (Reardon, 2014) this is mainly due to the fact that in the US, schools are funded through

property taxes. Poor areas have lower home values, and thus the schools receive less funding. The poor being less educated creates further economic inefficiency, as it represents missing out on a possibly smarter workforce. Decreasing income inequality will lead to a more productive workforce, leading to innovation and a better future.

Taking the dangers of income inequality into account, it is important to see how it affected individuals throughout the pandemic. It has been shown that higher income countries responded more effectively to the pandemic than lower income countries. It is possible that this could be seen on an individual level, with wealthy individuals responding to the pandemic more effectively than the poor. This led to the research question: Did income inequality cause the rich to be safer in the pandemic than the poor? More effective is interpreted as able to safely isolate from the virus without damaging one's financial wellbeing. If the poor were not able to effectively respond to the pandemic, it would mean they were either at a higher risk for COVID-19 exposure or damaged their financial wellbeing. Both scenarios represent an unfair punishment towards the poor, and another economic inefficiency created by income inequality.

Our analysis found that the correlation between the logarithm of gross domestic product per capita and workplace mobility is -0.205 , meaning a 1 percent increase leads to a 21 percent decrease in workplace mobility. The correlation between the logarithm on gross domestic product per capita and residential mobility is 0.307 , meaning a 1 percent increase leads to a 31 percent increase in residential mobility. This answers our question, showing that income inequality leads to the poor being at a higher risk of catching the COVID-10 virus.

This paper proceeds as follows. Section 1 reviews important literature relevant to the research question. Section 2 an explanation of our research methodologies, with section 3

displaying the data analysis and results, Section 4 concludes with a discussion on how our results can be used to better society, and what it means for our country

1. Literature review:

These papers are based on the SIR model for spread of disease, where S = susceptible, I = Infected, and R = recovered. $S + I + R = 100$ percent at all times. They use relevant equations to determine each variable. This model represents the basis for what each of these authors have expanded and applied to the spread of COVID-19.

Income Inequality Between Countries:

The most relevant source is the current working paper by Loris Rubini who was kind enough to let me read it. *The Unequal Impact of COVID-19 Across Countries*, by Loris Rubini, compares the major factors relating to how COVID-19 has affected countries differently. He specifically looks at income and age as important factors for determining the effect of COVID-19 on a population. Income levels are directly related to the type of work being done. A poorer country has less jobs that can be performed at home, so when a stay-at-home order is issued by the government, this also signals for periods without pay. Because families cannot survive for long periods without pay, many individuals in poorer countries were forced back to work. This increases the chance for contraction of the virus in lower income countries. (Rubini, 2020)

Using Google mobility data, Rubini was able to find that populations in lower income countries went to work more than those in high income countries. This was not due to arrogance, as they went to parks and grocery stores less than high income countries, but because they could not work from home.

As he also points out lower income countries have younger populations than those in high income countries. Younger individuals are far less likely to die from contracting COVID-19.

This is evident in the fact that as of May 2020, only 21 percent of COVID-19 deaths were in low-income countries, despite representing 85 percent of the global population. (Rubini, 2020)

With these two factors, he concludes that while infections were worse in lower income countries, less individuals died from COVID-19. The economic recessions were worse in higher income countries than in lower income countries, since they were forced back to work. (Rubini, 2020). This was the spark that led to the research question. If income inequality has a visible effect on how COVID-19 affects countries, is it possible that it is present on an individual level. Factors such as healthcare and type of job are seen between the poor and rich in the US. I believe that the effect of income inequality is also relevant on an individual level.

COVID-19 Mortality in Rich and Poor Countries: A Tale of Two Pandemics?, written by Schellekens and Sourrouille, further explores how COVID-19 could affect low income countries in the future. Due to effects on income inequality, such as higher population densities, generational family living, and the need to work, it may take much longer for the virus to be eradicated in lower income countries. This may negate the current fact that lower income countries have much less COVID-19 deaths. The longer the presence of the virus the higher chance it has of affecting the elderly and those at high risk due to specific conditions. Also, the governments have much less resources to combat COVID-19 in lower income countries, which will be drained as time moves forward.

How Should Policy Responses to the COVID-19 Pandemic Differ in the Developing World?, written by Alon, Kim, Lagakos, & VanVuren continues on the idea that developed (high income) and developing (lower income) countries were not only affected differently by COVID-19, but that they should respond differently to the virus as well. It shows that policies in lower income countries were largely similar to those in higher income countries but did not work as

effectively. Through their research and modeling the authors determined that demographic specific measures are much more effective in saving lives than blanket measures. Demographic specific measures have less of an effect on the economy and are cheaper to implement. Age specific measures are also more effective in lower income countries. They find that school lockdowns are able to save 5 times the number of lives than blanket lockdowns per unit of gross domestic product lost. In developing countries school lockdowns save 13 times the lives per unit of gross domestic product lost. (Alon, Kim, Lagakos, & VanVuren, 2020) In the US, our president never issued a mandate for the whole country, with every state having its own pandemic plan. The effects of the pandemic varied greatly between high- and low-income areas. It is possible that income inequality helps explain that higher income areas responded more effectively, and as such the poor areas did not.

Income Inequality Domestically:

Deadly Debt Crises: COVID-19 in Emerging Markets, written by Arellano, Bai, and Mihalache, explores the tradeoff between public health and public debt. As lockdowns were implemented, public health benefited, but public debt rose, leading to less aggressive lockdowns endangering public health. This dichotomy creates a conflict of interest. As the government explores remedies to COVID-19 they have to keep multiple factors in mind.

The authors propose that a debt relief program combined with aggressive lockdown measures is the best method for stopping COVID-19. An aggressive lockdown means incredibly limited movement and a complete shut down of the economy for two weeks. To avoid the damage to the economy, the government would relieve all debt caused by the aggressive lockdown. While this may seem like an expensive solution, it will save money in the long run across all parts of the economy. The lump sum spent on debt relief is less than the negative

effects to overall gross domestic product from lower consumption and planned investment. (Arellano, Bai, & Mihalache, 2020) It also decreases hospital spending by individuals and insurance corporations. A debt relief program and aggressive lockdown will let society return to normal sooner, mitigating the prolonged damage to the economy that we have seen in recent months.

How many jobs can be done at home? by (Dingel & Neiman, 2020) explores how the types of jobs effects the feasibility of social distancing for workers. They find that 37 percent of US jobs can be performed completely at home, mostly online. This number is much higher than the percent of jobs that are currently worked from home. These jobs were generally higher paying, as they represented 46 percent of all wage expenses in the US. Most of these jobs were centered around metropolitan areas, with some areas seeing as much as 45 percent of all jobs possibly being done at home. This data is highly important to our question. The possibility of one working their job at home is correlated with higher income jobs. This would mean richer individuals were more likely to self-isolate during the pandemic and be safer than the poor.

Determinants of Social Distancing and Economic Activity during COVID-19: A Global View, written by Maloney and Taskin, explores the idea that many COVID-19 remedies require voluntary participation by the population. Social distancing has been the biggest remedy imposed by the Government. By limiting human interaction in public and hoping for minimal contact in private, social distancing aims to eliminate the virus by keeping those with the virus away from those that do not have it. The authors describe these measures as Non-Pharmaceutical Interventions (NPI's). The data shows that as cases worsened across the US, workplace mobility decreased, even without NPI's. Once the NPI was in place, mobility decreased even further. The

NPI's are rooted in voluntary effort made by most of the public. However, when compared to lower income countries, it is clear that NPI's are harder to implement and less effective.

This paper is highly important to our question. If higher income counties were able to socially distance more based on NPI's, it is likely due to the type of work and accumulated wealth. This would directly support our research question and is an important piece of the puzzle in determining how the pandemic affected different areas of the country.

2. Research and Methodology

To test whether income inequality influenced work and residential movement during the pandemic, a measure of income and movement was needed. While it would be ideal to have data on an individual level, it was not feasible. Instead, it was decided to use county level data, which provides a small enough area to get a rough idea of the people living there, while still being easy to access.

Movement data was provided by the Google Mobility report. This data set uses mobility data compiled by Google for almost every county in the United States. It does not have data for the sparsely populated counties, which are not entirely relevant to our question, as these people are already safer from covid compared to populated areas. The mobility report includes daily data from February 15th, 2020 to September 11th, 2020, for a total of 208 days. Each county is given a percent change in work and residential movement, benchmarked prior to the pandemic. This allowed us to calculate the average movement for every county during the pandemic. Work and residential movement are important to each other, as person not going to work, whether it be online or not at all, would likely be at their home. This Average movement was calculated using Small Stata 15, and exported to Microsoft Excel.

Following this we needed an idea of average wealth within each county. Gross Domestic Product per capita was chosen because it represents economic performance of an area as shared by the population. An area with high gross domestic product per capita likely has better jobs available, better healthcare, and public infrastructure. In order to calculate gross domestic product per capita for every county, 2019 gross domestic product data was taken from the Bureau of Economic analysis. Population for every county was taken from the US census bureau, which had 2019 population estimates. Then, gross domestic product could be divided by population to give gross domestic product per capita for every county.

From here, the logarithm of gross domestic product per capita was taken for every county. This was important, as it gives all the gross domestic product per capita values on a base of 10, removing the dollar unit tied to each number. When calculating the correlation, this would mean the correlation would be in a percentage, instead of dollars. With this done, the correlations could be calculated. Using one large Microsoft excel table, the correlations were found, along with graphical representations created.

3. Data and Results

Correlation between log of GDP per capita and work movement:	-0.205
Number of counties	2716
P Value	0.000
Correlation between log of GDP per capita and residential movement	0.307
Number of counties	1492
P Value	0.000

These results support the idea that richer counties were less likely to go to work and more likely to be at home, as shown in Figures 1 and 2. A 1 percent increase in log of gross

domestic product per capita meant a 21 percent decrease in going to work and a 31 percent increase in being at home. This is evidence that income inequality played a role in determining how safe individuals were from COVID-19. This is an incredibly important statistic, as income should not influence personal safety during a pandemic.

Table 1 contains all the same calculation but done by state average. This gives an idea for how the data looked overall. However, when only using state average the results are much more aggressive. State average correlation between log of gross domestic product per capita and work movement was $-.422$ and correlation between log of gross domestic product per capita and residential movement was $.458$. This is due to state averages being compiled of all county data, which smooths out the high and lows of county movement for the state average. This also creates much less variation in the gross domestic product per capita. Combined, this makes the correlations stronger. The county data is therefore more accurate to reality, but the state data provides a better picture of how the effect of income played on a macro scale.

Discussion

The results show an unfortunate fact about the United States during the pandemic. If richer counties were less likely to go to work and more likely to be at home, it means they were safer. This also means that poor counties were less safe. This is income inequality on display. The poor areas of our country were punished by their income levels. They were forced to work in person away from the safety of their homes. They did not have the options for at work like many wealthy individuals (Dingel & Neiman, 2020), forcing them to be possibly exposed to COVID-19

This creates a major issue among the poorer individuals in our country. Their lives are just as important as anyone else's but did not receive the same safety benefits as the wealthy.

Unfortunately, income inequality is also correlated to worse healthcare. With poorer individuals unable to socially distance, they had an increased chance to get COVID-19. If they were to contract the virus, they would also have worse healthcare, and less of an ability to pay their bills. This adds to the compounding effect created of income inequality. The pandemic made it harder for the poor to survive, and easier for the rich.

Figure 1

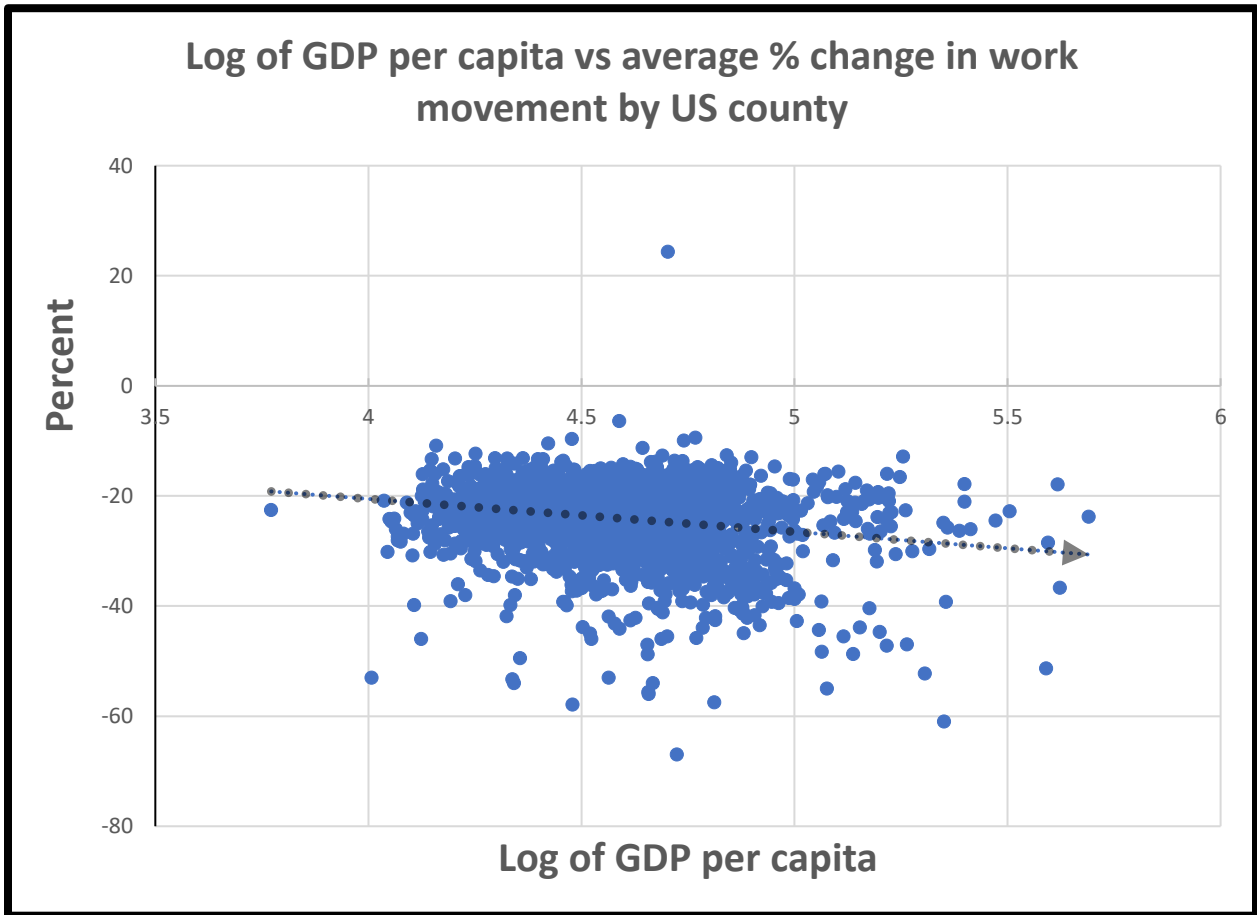


Figure 2

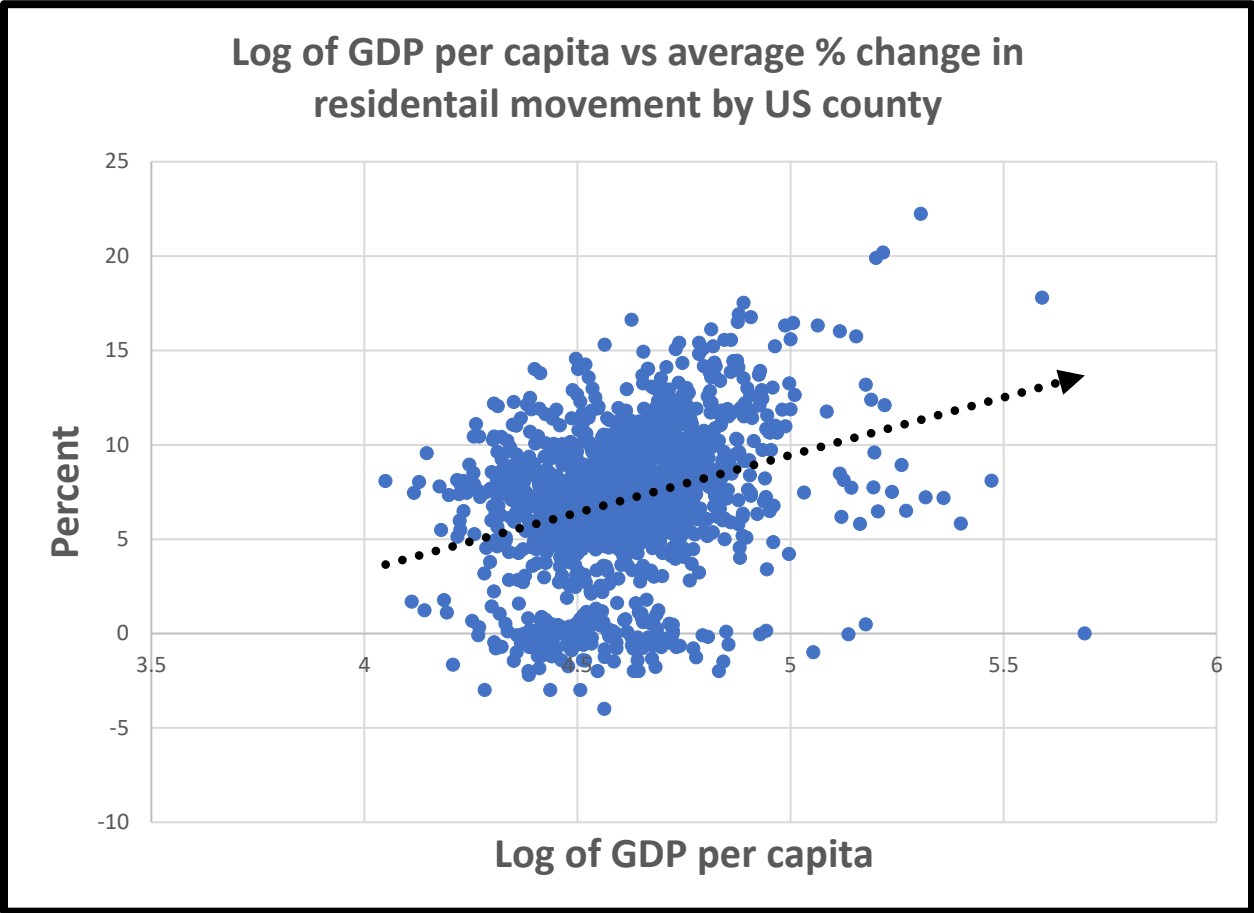


Table 1

State	GDP per Capita	Log GDP per Capita	% change work	% change Residential
Mississippi	\$ 35,015.00	4.54	-23.18744	7.284437
Arkansas	\$ 39,580.00	4.60	-20.6846	6.370657
West Virginia	\$ 40,265.00	4.60	-23.49961	7.208937
Idaho	\$ 40,566.00	4.61	-22.50984	4.983884
Alabama	\$ 41,389.00	4.62	-21.56043	6.910186
South Carolina	\$ 41,457.00	4.62	-22.47342	7.302838
Kentucky	\$ 42,386.00	4.63	-24.49639	8.124265
Maine	\$ 43,541.00	4.64	-23.40398	6.862443
Montana	\$ 44,145.00	4.64	-22.34395	5.0317
Arizona	\$ 44,161.00	4.65	-26.74667	8.298619
Florida	\$ 44,267.00	4.65	-25.19553	8.606748
New Mexico	\$ 46,304.00	4.67	-26.35085	9.002955
Missouri	\$ 47,407.00	4.68	-19.02111	6.363307
Michigan	\$ 47,448.00	4.68	-25.32282	8.381513
Tennessee	\$ 48,440.00	4.69	-21.50748	6.595072
North Carolina	\$ 48,496.00	4.69	-22.76939	7.636385
Vermont	\$ 48,855.00	4.69	-29.91709	9.854909
Indiana	\$ 49,321.00	4.69	-22.71698	7.188671
Nevada	\$ 50,043.00	4.70	-26.21805	8.265027
Georgia	\$ 50,816.00	4.71	-23.24458	8.350179
Oklahoma	\$ 50,876.00	4.71	-22.17424	6.424352
Utah	\$ 51,407.00	4.71	-26.04195	7.249033
Louisiana	\$ 51,729.00	4.71	-23.96178	8.105733
Rhode Island	\$ 51,963.00	4.72	-29.3254	10.02788
Wisconsin	\$ 52,534.00	4.72	-21.62338	8.016086
Ohio	\$ 52,664.00	4.72	-23.6376	7.544874
Oregon	\$ 52,726.00	4.72	-25.11129	6.863487
South Dakota	\$ 52,913.00	4.72	-22.93003	6.906015
Kansas	\$ 53,528.00	4.73	-21.96125	7.371202
Iowa	\$ 55,051.00	4.74	-21.07564	7.255042
Pennsylvania	\$ 56,868.00	4.75	-25.91444	8.386672
Virginia	\$ 56,938.00	4.76	-26.58744	9.702501
New Hampshire	\$ 57,272.00	4.76	-25.95541	9.029308
Hawaii	\$ 58,981.00	4.77	-32.36095	12.51777
Nebraska	\$ 59,386.00	4.77	-20.58863	7.259898
Minnesota	\$ 60,066.00	4.78	-24.28329	8.889152
Colorado	\$ 61,311.00	4.79	-27.89843	9.044935
Texas	\$ 61,682.00	4.79	-23.85213	8.938094
Illinois	\$ 61,713.00	4.79	-24.01518	8.205414
Maryland	\$ 61,926.00	4.79	-28.88475	11.48904
New Jersey	\$ 63,492.00	4.80	-33.11818	12.63003
Delaware	\$ 64,985.00	4.81	-27.25595	9.260714
Wyoming	\$ 67,915.00	4.83	-21.01852	5.255781
District of Colu	\$ 69,761.00	4.84	-46.78571	16.46667
Washington	\$ 69,761.00	4.84	-27.98644	7.65022
Connecticut	\$ 69,789.00	4.84	-30.0672	10.25186
California	\$ 70,662.00	4.85	-28.90393	10.4065
North Dakota	\$ 70,991.00	4.85	-21.51701	6.823445
Alaska	\$ 74,422.00	4.87	-21.13467	5.810976
New York	\$ 75,131.00	4.88	-28.40092	9.962767
Massachusetts	\$ 75,258.00	4.88	-31.76973	11.74484

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