

Inventors in the US

Abstract:

Who is likely to become an inventor in the US?

This project explores the relationship between inventors rate, income background and economic mobility. I have used regressions and matching models in order to see whether income distribution has a relationship with inventors rate and female inventors share at the state, commuting zone and college level.

The data shows a clear relationship between income background and inventors rate, and a weaker relationship between income background and female inventors share. When the share of the population in the upper income quintiles is high in a state, commuting zone, or college, there is, on average, a higher inventors rate as well.

My main research question is whether economic mobility can explain the difference in inventors rate across places that share similar characteristics. To explore this question, I used matching models at the state, commuting zone and college levels. The results are significant at the commuting zone and college levels and insignificant at the state level.

Background:

Who is likely to become an inventor? Does the income of our parents impact our chances of being listed on a patent application? Is a higher economic mobility associated with a higher inventors rate, when comparing two places with a similar income distribution?

This app is based on the data collected by Opportunity Insights. From the data collection and analysis of Opportunity Insights, we can see how inventors rate is highly correlated with parents' income. We can also see how children who grow up in places with a high invention rate, are much more likely to become inventors.

In the "Income" tab, you can interactively explore the associated relationship between income level and inventors rate. The data is divided into five income quintiles, where the fifth quintile represents the top 20% Off the income distribution, and the first represents the bottom 20% of the income distribution.

In the "Gender" tab, you can interactively explore the relationship between income level and female inventors share. The female inventors share is calculated as the percentage of female inventors out of the inventors in a specific state or commuting zone. This is different from the female inventors rate itself, which represents the fraction of female inventors out of the whole population, and thus does not account for differences in magnitude of inventors rate across different places. For example, state X can have a higher female inventors rate than state B, but a lower fraction of female inventors out of the total inventors in that state.

The main question of this project is why do we see a difference in inventors rate between places that share similar income distribution. In the "Economic Mobility" tab, I have made three matching models, in order to see whether economic mobility explains why places with a similar income level have different inventors rate. Places that share similar income distribution might differ substantially by their economic mobility rate. For commuting zones and colleges, economic mobility rate is defined in this data set as the probability of someone to reach the top

20% percent of the income distribution, given that her parents are at the bottom 20% percent. For states it is defined as the probability of earning more than your parents.

There are many variables that can explain the difference in inventors rate across places with similar income distribution. The ratio of teachers to students is one small example, but there are many more. Therefore, in my model I have matched places on income level, but on other variables as well such as crime rate, gini coefficient and more.

I have decided to use matching models since I wanted to see whether household income is a potential confounding variable that affects the relationship between invention rate and economic mobility. Therefore, I matched places with similar income distribution and other relevant control variables, and checked whether those with a higher invention rate have a higher economic mobility as well.

Methods:

Data collection: I have used the data collected by Opportunity Insights, which can be found and downloaded here:

https://opportunityinsights.org/data/?geographic_level=0&topic=107&paper_id=0#resource-listing

Variable creation: In order to create the treatment variables for the three matching models, I have created the ‘Tr’ variable, which equals 1 for every states, commuting zones or colleges that have a mobility rate above the mean value, and equals 0 otherwise.

Analytic Methods. In this project I have used regressions and matching models. In the matching models, I have control for variables that might be related to invention rate, such as income distribution, education and etc.

Results:

The matching models show different results for the different area levels - states, commuting zones and colleges.

The treatment estimate at the state level is insignificant and is relatively small in magnitude, implying that economic mobility is not a variable that explains the difference in inventors rate across states that share similar income distribution. An important caveat that should we mention here, is that I have not control for other variables at the state level model.

Exploring the results of the commuting Zone level, however, shows a different picture. The estimate is significant with a P-value of 0.006033. The estimated value is 0.0003321, and when comparing it to the mean value of inventors rate (0.00181) we can see that the magnitude is large.

At the college level we can see similar results. The estimated coefficient is 0.0093012, with a P-value of approximately 0.02. The mean value of inventors rate at the college level is 0.00881, which shows that the estimated coefficient is very large in magnitude.

Conclusion:

The analysis of Opportunity Insights shows a clear relationship between parents' income and their children invention rate. Using matching models, I showed that economic mobility might be a confounding variable that impacts the relationship between parents' income and children inventors rate at the commuting zone and college levels.

References:

1. https://opportunityinsights.org/data/?geographic_level=0&topic=107&paper_id=0#resource-listing