

Data Mining Assignment 3

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Problem 1: What Causes What?

1- Why can't I just get data from a few different cities and run the regression of "Crime" on "Police" to understand how more cops in the streets affect crime? ("Crime" refers to some measure of crime rate and "Police" measures the number of cops in a city.)

The reason we have an endogeneity issue in our regression (Crime on Police) is that the police variable is correlated with the error term, meaning that high crime rates lead to more police hires. This indicates that our results will be unreliable and biased. There are a few ways we can avoid this problem, such as finding and including missing variables, using a proxy variable, using a fixed effect estimator with panel data, or using an IV to replace the endogenous variable with the predicted value that has only exogenous shocks.

2- How were the researchers from UPenn able to isolate this effect? Briefly describe their approach and discuss their result in the "Table 2" below, from the researchers' paper.

The researchers wanted to see if having more police officers on the street in Washington DC would reduce crime rates. However, they had a problem with their analysis because the number of cops might be related to crime rates in a way that could cause biased results. To deal with this, they used a variable called "Terror Alert" as a substitute for the number of cops, since it is an unrelated variable that also affects crime rates. They found that when the Terror Alert level was raised, crime rates went down. But also, there was another thing that is worth noticing is that the variable might not be a perfect substitute, so they included another variable called metro ridership to check if that could be causing any changes in crime rates. They found that even after accounting for metro ridership, raising the number of cops still led to a decrease in crime rates by 6.1. So, in conclusion the study suggests that increasing the number of cops on the street could reduce crime rates in Washington DC.

3- Why did they have to control for Metro ridership? What was that trying to capture?

The data on police and crime cannot determine if having more police causes less crime or if more crime leads to the hiring of more police officers. In fact, if we look at different cities, we might see a correlation between more police and more crime, because when crime goes up, mayors may hire more police officers. It would be great to conduct an experiment where we randomly place police officers in different parts of a city on different days to see how it affects crime, but that's not feasible in reality.

The researchers at UPENN found a natural experiment by studying crime in DC during high alert days for potential terrorist attacks. By law, the mayor has to put more police officers on the streets during these days, which creates an experimental setting. The researchers found that, when controlling for subway ridership, high alert days had a lower crime rate. This is because, if people stay indoors during high alert days, there are fewer opportunities for crime to occur. The study shows that having more police officers on the streets during high alert days can have a negative impact on crime.

We can't definitively prove that having more police officers leads to less crime because there could be other factors at play. For example, if criminals are afraid of potential terrorist attacks and stay home during high alert days, there would be less crime, but it wouldn't be because of the increased police presence. However, this explanation is unlikely, and the study's results strongly suggest that having more police officers on the streets can reduce crime.

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The researchers looked at whether the increase in police presence during high alert days had the same effect on crime in all areas of town. They found that the increase in police presence only seemed to make a difference in District 1, which is where most of the potential targets for terrorism are located. In the other districts, there was still a small decrease in crime, but it was not statistically significant, meaning it could still be due to chance. This suggests that the presence of more police officers may be effective in preventing crime in certain areas, but not necessarily everywhere.