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Peer Effects on Officer Misconduct - Checkpoint 1

Our objective in this analysis was to look at the distribution of the level of misconduct across different groups of officers at the level of units and beats. The ultimate aim here is to better understand how an officers' level of misconduct is affected by their peers and by better understanding the distribution of misconduct across different groups of officers as defined by the mean and standard deviation, we can see the shape of distributions. Distributions with a smaller standard deviation would suggest that the level of misconduct is more correlated within a group which would support the possibility of causal peer effects, though may also point to a number of other factors in play in shaping the distribution. Nonetheless, we look at the distributions first as a starting point for this analysis.

We begin by looking at the mean and variance of the level of misconduct within units and beats as defined by the allegation count of officers within a unit or beat divided by the numbers of officers within the group and the number of years those group of officers worked in that group.

We first create a temporary table mapping officer ids to only civilian allegations and another table mapping an officers' id to their average number of civilian allegations per year (allegation count divided by their time as a police officer in years).

Question 1: What is the mean and variance of the civilian complaints per year for different units?

To find the mean and standard deviation of the level of misconduct within a unit, we create a temporary table that joins the civilian officer allegations to data_officerhistory if they occurred between the time the officer worked in that unit. We then group the officers and units and aggregate the count of allegations divided by the time the officer worked there to get allegations per year. We then aggregate these values to get a mean and standard deviations of levels of misconduct for every unit. We then filter out all units which do not correspond to one of the 25 districts. We can then get the average mean and standard deviation of all the distributions and end up with a mean of 0.64 and standard deviation of 1.04 across all units. This suggests a rightward skew which is what we could expect as most officers should have a relatively low number of allegations per year.

Question 2: What is the mean and variance of the civilian complaints per year for different beats?

For this question, we look at both a beat as a group of officers and a watch within the beat as a group and compare results from both. First, like as in the case with units, we use the

assignment and attendance table to map officers to beats and get an allegation count for each based on their time within that group as defined as being between their earliest shift and latest shift in that beat. We then divide that allegation count for each officer with the time they spent there in years to get allegations per year. It is unclear what many of the values in the assignment and attendance table correspond to as many are not valid beat ids from the data area table. When we join with data area, we get only 159 unique beats, which is significantly short of the 277 beats in Chicago and the 275 unique beats in the data area table. However, we continue the analysis with what we have. Like in the case of units, we can now aggregate these misconduct levels and get a mean and standard deviation of allegations per year for each of our 159 beats. On average, the average of the mean and standard deviation across beats is 0.163 and 0.392 respectively. Like in the case of units, we still see the rightward skew as expected, but a much smaller standard deviation suggesting a tighter distribution and suggesting more correlated behavior.

Now we do the same as above except group by watches as well as beats. This way we can see the number of allegations per year for each beat and watch. If there do exist significant peer influences on level of misconduct, we may see an even tighter distribution when we aggregate these mean and standard deviation for beats and watches as we may suspect the same officers are working closer together. Across beats and watches, we see an average mean and standard deviation of 0.159 and 0.375 respectively. Slightly lower than when just grouped by beats, but not significantly.

Question 3: What is the distribution of types of complaints for different units?

For this part of the analysis, we look at the distribution of the categories of allegations across units. The motivation behind this is that if there exist peer influences, there may further be a concentration of certain types of misconduct. To start this analysis, we join data_officerallegation with data_allegation and allegation category then filter out none civilian allegations. We make that a temporary table then join it with data officer history to get each allegation category for each officer in each unit. We divide each type of allegation into its own column and create another total column for the total number of allegations in that unit for that officer. Using this we can now analyze the distribution of allegation categories.

We decide to use the Gini impurity metric as a measure of how evenly distributed the categories are across groups. Of course, we would naturally expect an uneven distribution, but this will allow us to compare the distribution at lower levels such as beats where we can expect stronger peer affects and learn from the relative difference in the Gini impurity where we expect a higher impurity when allegation types are less correlated. We compute the Gini impurity for each beat and average this metric across beats, giving a Gini impurity of 0.811.

Question 4: What is the distribution of types of complaints for different beats?

For computing the allegation category distribution across beats, we use our temporary table associating each officer to each beat and join allegation category on the officer id as above. Again we compute Gini impurity for each beat and average the results getting an average of

0.8002. This is slightly lower as we may expect indicating that the types of misconduct are more unevenly distributed which is consistent with the results from question 1 and question 2 where we found a tighter distribution on allegations per year for beats compared to units.

Going beyond beats, we compute the Gini impurity of allegation types for crews. Here we do expect a lower impurity as the crew table was constructed based on officers who work together and we do see this. Joining the allegation categories from above with the data_officer crew table and again computing the Gini impurity for each crew, we get an average of 0.721.

Many factors may point to the results from above including similar environments and officers with similar backgrounds working together, but does partially support the possibility of peer influences as it suggests that misconduct is not random and independent as argued by the "bad apples" hypothesis.

Further Analysis

Our next steps beyond checkpoint 1 are to analyze how an officers' level of misconduct changes as they move to a different group of officers. This analysis starts by looking at how the z-scores of an officers' level of misconduct compared to the z-score of the level of misconduct of the group they are in. This way, we can look only at instances of officers moving from low misconduct groups to high misconduct groups and vice versa. We use a slightly different set of queries as this was done before the above analysis. Essentially, we group allegations for each officer on officer ids and unit ids using the data_officerhistory table. Then we group by the officer's id and unit's id, and formatting the allegation frequency using the respective mean and standard deviations to get the respective z-scores. Looking at the results, it seems that in general, an officer's allegations per year correlate fairly with the unit's allegation frequency. Being able to predict this change across units and beats will partially be the subject of our analysis for checkpoint 4 and 5.