CS506
Final Project
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Historic levels of citizen interest in police divestment prompted the Boston City Council to drop $10 million dollars from the Boston Police Department overtime budget in the summer of 2020. With nine Boston Police collective bargaining agreements up for negotiation in the coming year, observations are being made about the use of the BPD budget including potential excessive overtime compensation and possible wasteful spending practices. Our major clients ACLU Mass. and Progressive Mass. were both interested in an analysis of court overtime in the BPD. In collaboration with the two former bodies as well as the office of City Councilman Riccardo Arroyo and Mr. Nathan Story of the Woke Windows Project, our team was able to make some crucial inroads toward a more developed understanding of the overtime spending tendencies of the Boston Police Department.

DATA COLLECTION:

Working with our clients at Progressive Mass. and ACLU Mass., we were given a 'hot dataset:' Boston Police overtime records with in-depth data on all court overtime requests from 2014-2019. In addition, after calls with our clients we were given one additional dataset to work with - a BPD personnel dataset, acquired by a reporter with an anonymous source. This dataset extended the former critically by including hourly pay and demographic data for every BPD officer which would become a very large part of the narrative that our clients were interested in.

In addition, we also used the 2019 City of Boston employee earnings report, which is publicly available on the Boston Open Data portal, to answer broad questions about employee earnings. We had to use this dataset to inform our analysis of overtime earnings in other our other data sources.

DATA PREPARATION AND CLEANING:

Because we were working with data that came from municipal record-keeping we were fortunate to not have to perform significant preprocessing. Our data mostly came in the form of a 17F request from City Councilman Riccardo Arroyo.

For the first stages of our project including our first deliverable most of our data preparation (filtering out extraneous values, joining the Court Overtime data by year) was accomplished in Python using Pandas. However, after discussing as a team, we decided to use Tableau exclusively as it was far more optimal for the needs of our project. We used Tableau to

merge the datasets, specifically the Court Overtime records with the BPD Personnel dataset. We accomplished this by merging on the Last Name, First Name field which both datasets shared, making it an easy task in Tableau.

ANALYSIS:

Working with our clients at Progressive Mass. and ACLU Mass., we were asked to find evidence of BUPD overtime budget waste, and initially had a list of 3 base questions to look into. After several calls with our clients in which we showed our findings in visualizations, they narrowed down their scope to a few central talking points. Our analysis was used as evidence to support the narrative of a written report and was submitted as Public Written Testimony to the Boston City Council Committee on Ways and Means Hearing on Dockets #0839 & #1039 – November 16, 2020. All of our visualizations and calls with clients were done before that date. The writeup, done by Lauren Chambers of the ACLU Mass., can be found here.

We created the visualizations using Tableau, and for the final product we didn't need to use any Python code for visualizations or model building. The clients were interested in using the acquired data to tell a story about wasteful BPD overtime spending. The intended audience of the analysis would have little appetite for overly complicated metrics or models and as a result we collectively decided to focus on developing cogent, topical visualizations that would provide additional substance to the claims made by our clients. All visualizations used by our clients (and some additional backlog of Vizzes) were put onto the "BU Spark!" Tableau Public website; however; all Tableau visuals created by the group can be found here.

The following sections are our own analyses of the visualizations that we provided to our clients. Below our written descriptions are the vizzes themselves with appropriate tagging. Each visualization is post-scripted with a brief description of the process used to create it.

1. **The four-hour minimum court appearance policy is wasteful.**

One of the largest questions that we were tasked with answering was to find out how much money is wasted on Police Overtime in relation to appearing in Court. In the current Collective Bargaining Agreement (CBA) between the Boston Police Department and the Boston City Council, officers would charge the city a minimum of 4 hours of overtime regardless of how long they would spend in court that day. This disparity could be seen in **Figure 1**; which shows that although overall overtime hours billed is going down year over year, the amount that is being billed is decreasing at a slower rate. This is evident in **Figure 2**; which shows how the ratio of hours worked to hours billed has decreased year over year.

Once we converted the data into dollar amounts, as seen in **Figure 3**, we could show the client just how much money was being wasted by the 4 hour minimum policy. This was an important visual needed for the hearing, since it came before re-negotiations of the CBA for the

Boston Police Department. In 2014, out of the estimated $7.44 million spent on court overtime, $2.97 million was wasted because of the 4 hour minimum policy. In the most recent year, 2019, $3.09 million was estimated as waste out of the total $5.90 million paid for court overtime.

2. **Officers are increasingly exploiting court overtime.**

The main indicator that the current court overtime system is being exploited more as the years go on can be found in **Figure 2**. This figure shows how the 'utilization' (hours worked over hours paid), has decreased over the last 6 years, indicating that the 4 hour minimum policy has been abused by BPD more in recent years. The utilization value found from the data in 2019 court overtime was less than .5 (at .477), showing that less than half of the hours paid for court overtime were actually worked.

Echoing what was said above, the 4 hour minimum policy is a wasteful part of the BPD budget and is progressively becoming a larger part of that problem, even if total court overtime hours have gone down.

3. **Excessive overtime operates as an incentive.**

Our clients at ACLUM and ProgMass were interested in finding evidence that the overtime system was used less as a utilitarian pay increase for officers performing extra work and more as a reward for longer tenure members of the Police force. Paraphrasing the analysis of Lauren Chambers of ACLUM, the data indeed supports this hypothesis.

The data show that, on average, Captains in the police force earned roughly $50,000 per year solely from overtime compared to their Sergeant and Patrolman colleagues who earn roughly $20,000 per year. This trend is demonstrated in **Figure 4**. It is also echoed in **Figure 5**, which shows that higher ranking officers such as Sgt. Detectives and Detectives had ~7% more, for a total of ~26% of their total yearly income coming from OT pay as opposed to ~19% for Patrolman and Sergeants.

These pieces of evidence can be used as evidence to support a critical commentary on the use of OT funds.

4. **Not all court appearances are created equal.**

An additional point our clients wanted us to emphasize was how some types of court appearances that officers make are more wasteful than others. This is shown in **Figure 6**, where we break down different appearance types by their respective utilizations of hours worked vs billed. This data visualization allowed our clients and Councilman Arroyo to ask pertinent questions about why officers were asked to come in to these more wasteful types of court appearances, and question if those appearances were necessary, while also drawing attention to the wastefulness of the 4 hour minimum of court hour overtime.

Another subpoint our clients wanted us to show was the pertinence of officers appearing at pretrial hearings. For this, we created **Figure 7**, which shows which police squads/districts had a significant number of pretrial appearances by officers. This was used by our clients to question

if these pretrial appearences (which are shown in **Figure 6** to be wasteful in terms of utilization) were even necessary for officers to attend.

LIMITATIONS:

We would have liked to have had more data on exact total YoY overtime payments for individual officers but unfortunately these data come from the city via public records requests. Therefore our access was limited by the response time of the city. We had to make some key assumptions in order to draw conclusions, primarily that court overtime was charged the same as regular BPD overtime - 1.5x regular pay.

Another assumption we had to make was that all data provided was accurate - given that we had an anonymous data source, this was a critical assumption to make. After having discussed this at length with our clients we concluded that we were comfortable reporting it as fact for a variety of reasons but it is still very worth noting that any additional available cross-checking is a very good idea in the future. A final assumption we had to make was that Hourly wages were uniform across ranks and positions.

POTENTIAL FUTURE WORK:

For the future, it will be important to look at the upcoming Boston Employee Earnings reports once they are released. They would be important for analyzing and seeing if overtime earnings among officers decreases year over year or not in the future. In addition to this, submitting requests to the City of Boston would be crucial to being able to analyze the court overtime data specifically. If available, requesting information about the demographics for the officers every year would allow for a deeper analysis on demographics for future projects.

DOCUMENTATION:

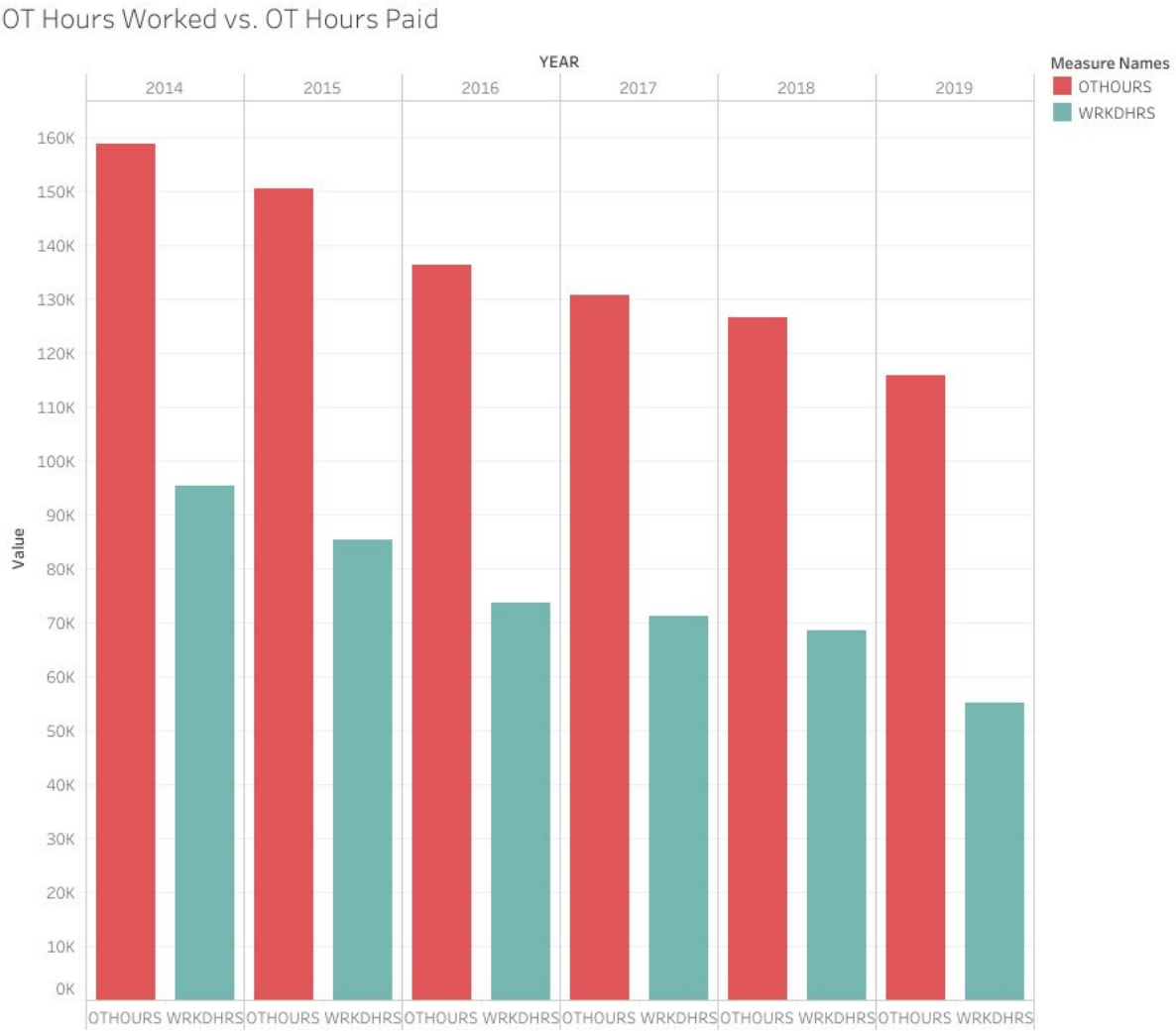
To see how our work was created, please look at **Figure 8**, which describes how to access the work and view the methods used. Downloading the Tableau workbooks gives access to Tableau visualizations, showing what methods were used; as well as the corresponding Excel sheets.

Most Visuals were made by placing hours or their associated cost on the Y axis, then placing time or various groups on the X axis. Police units were placed into groups based on their districts in Boston and Filter checkboxes are included in visuals on the right side to include or exclude variables that form the X axis.

Some calculations, such as wages, were inputted into the Excel sheets using VLOOKUP based on average wages for different ranks. To see the Excel sheets, please download packaged workbooks as described above, and for more help navigating Tableau, please click here.

FIGURES

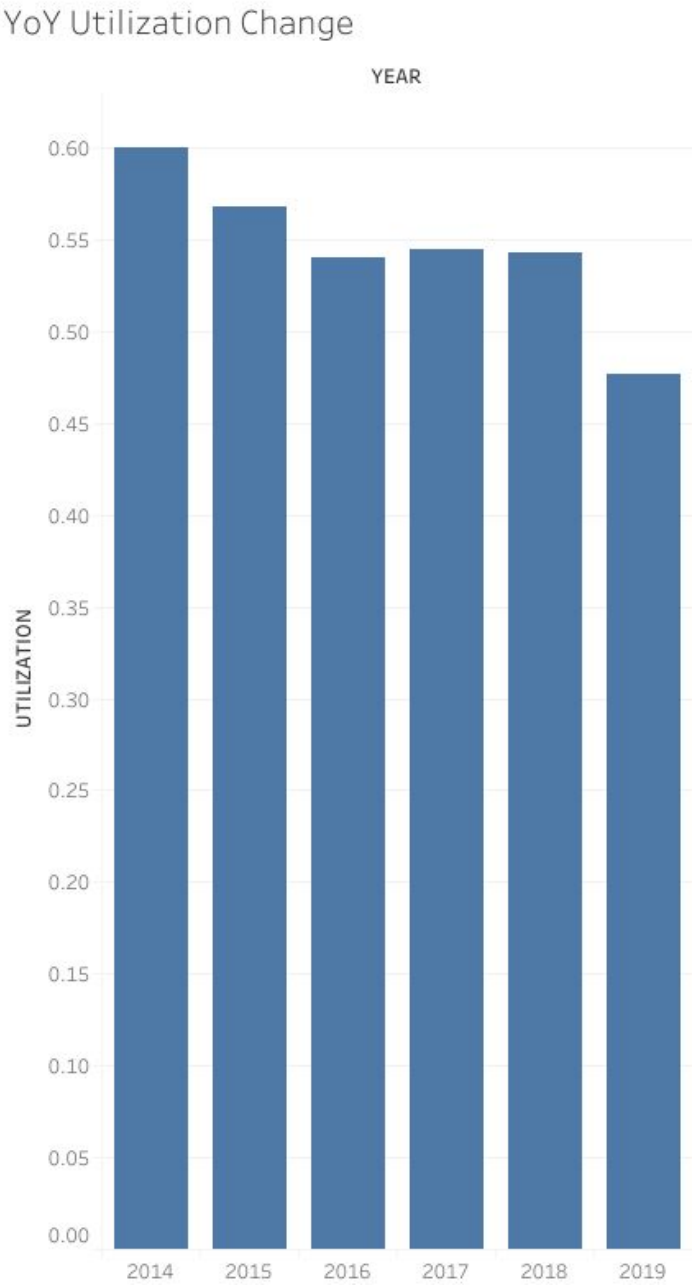
Figure 1: Disparity between Court OT Hours Worked and Court OT Hours Charged.



Description:

The yearly data was calculated by summing the total court overtime hours that were charged to the city of Boston ('OTHOURS'), and comparing it to the hours actually worked by the officers ('WRKDHOURS').

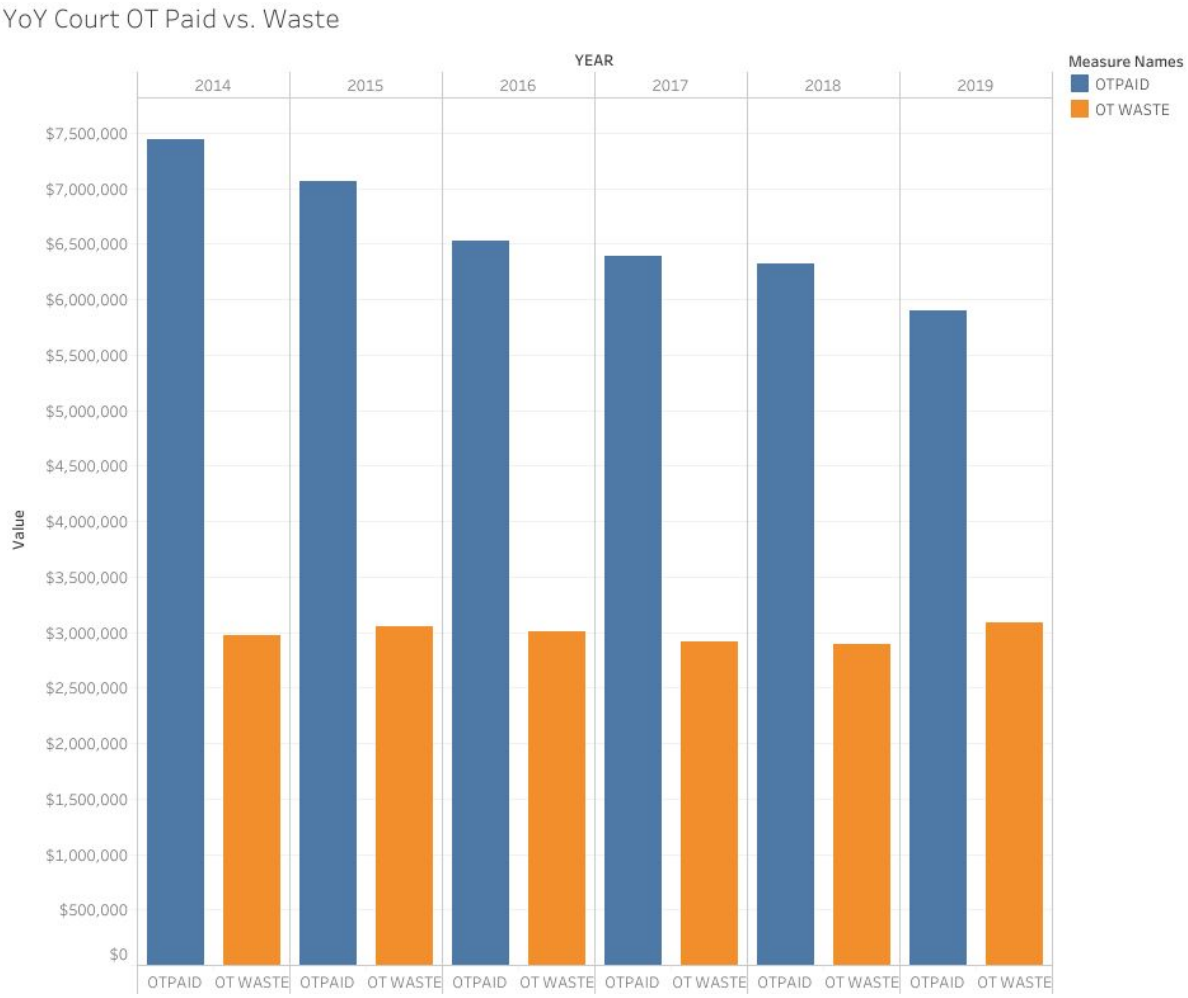
Figure 2: YoY Change of Utilization in Court Overtime



Description:

Utilization is calculated as the number of court overtime hours worked in total over the number of court overtime hours billed in total. ('WRKDHOURS')/('OTHOURS').

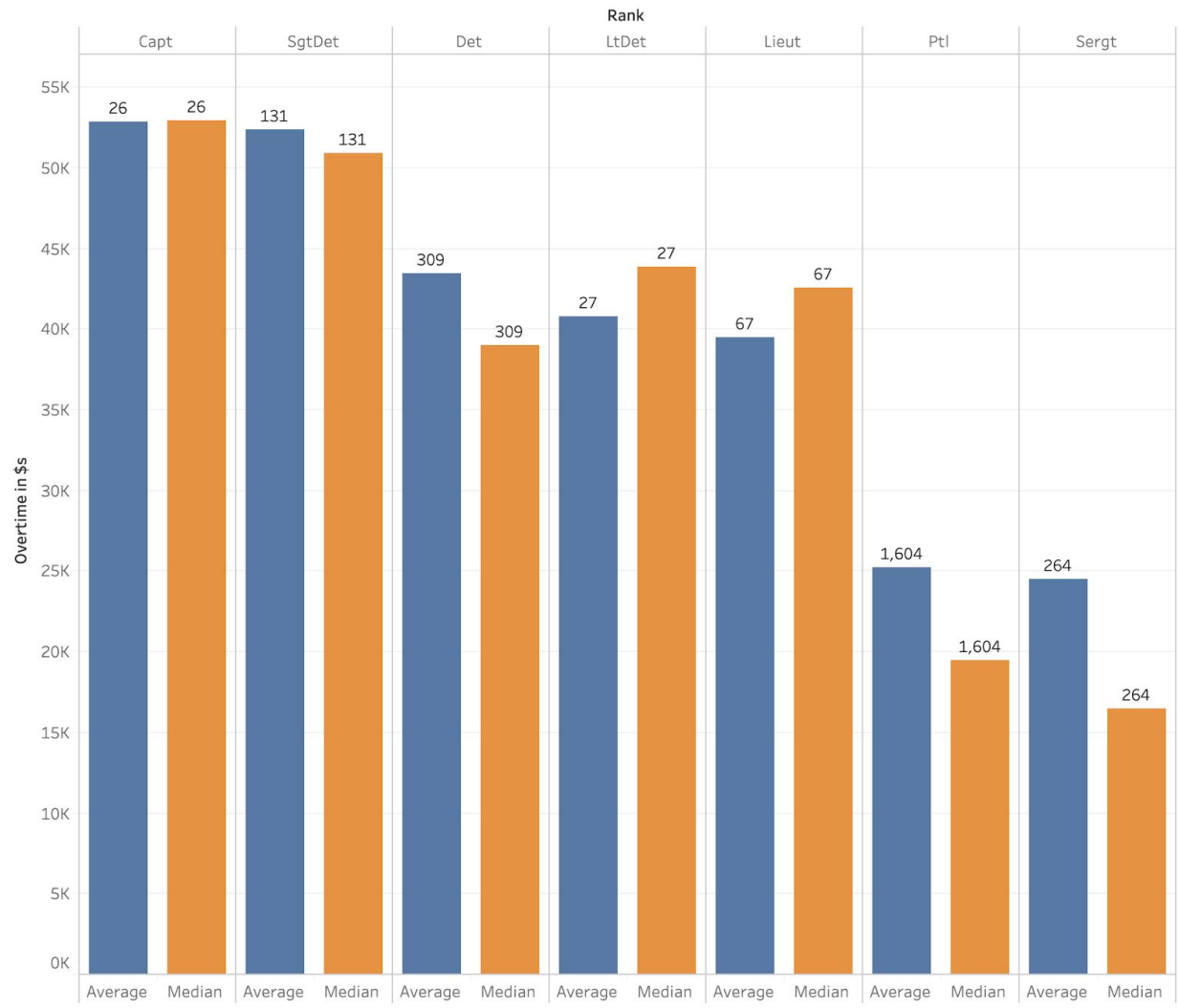
Figure 3: Monetary Difference between OT Paid and OT Wasted



Description:

The yearly data was calculated by summing the amount officers were paid for their court overtime hours based on rank. The waste data was calculated by using that same wage, based on rank, and multiplying it by their unworked hours.

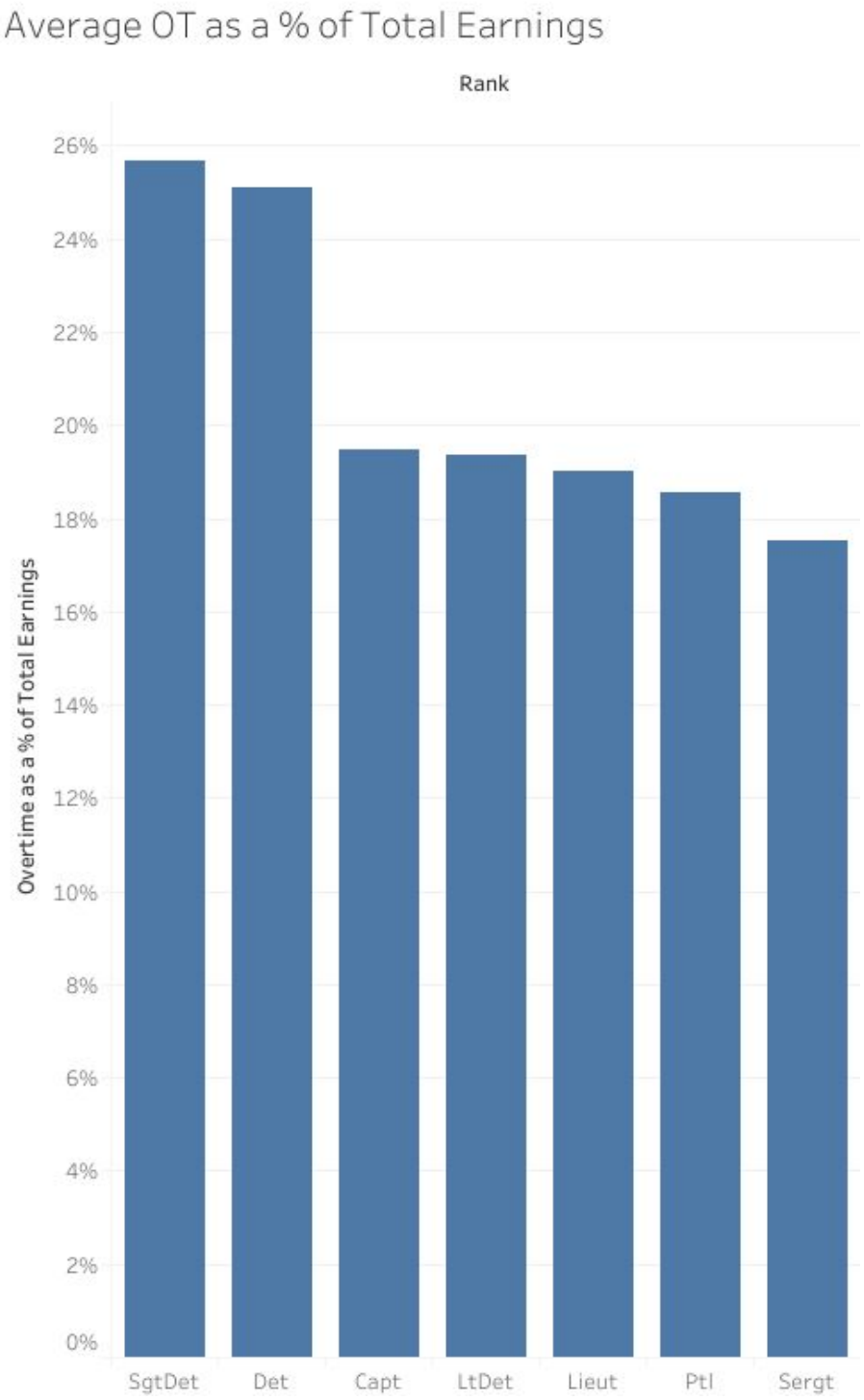
Figure 4: Overtime Earnings by Rank



Description:

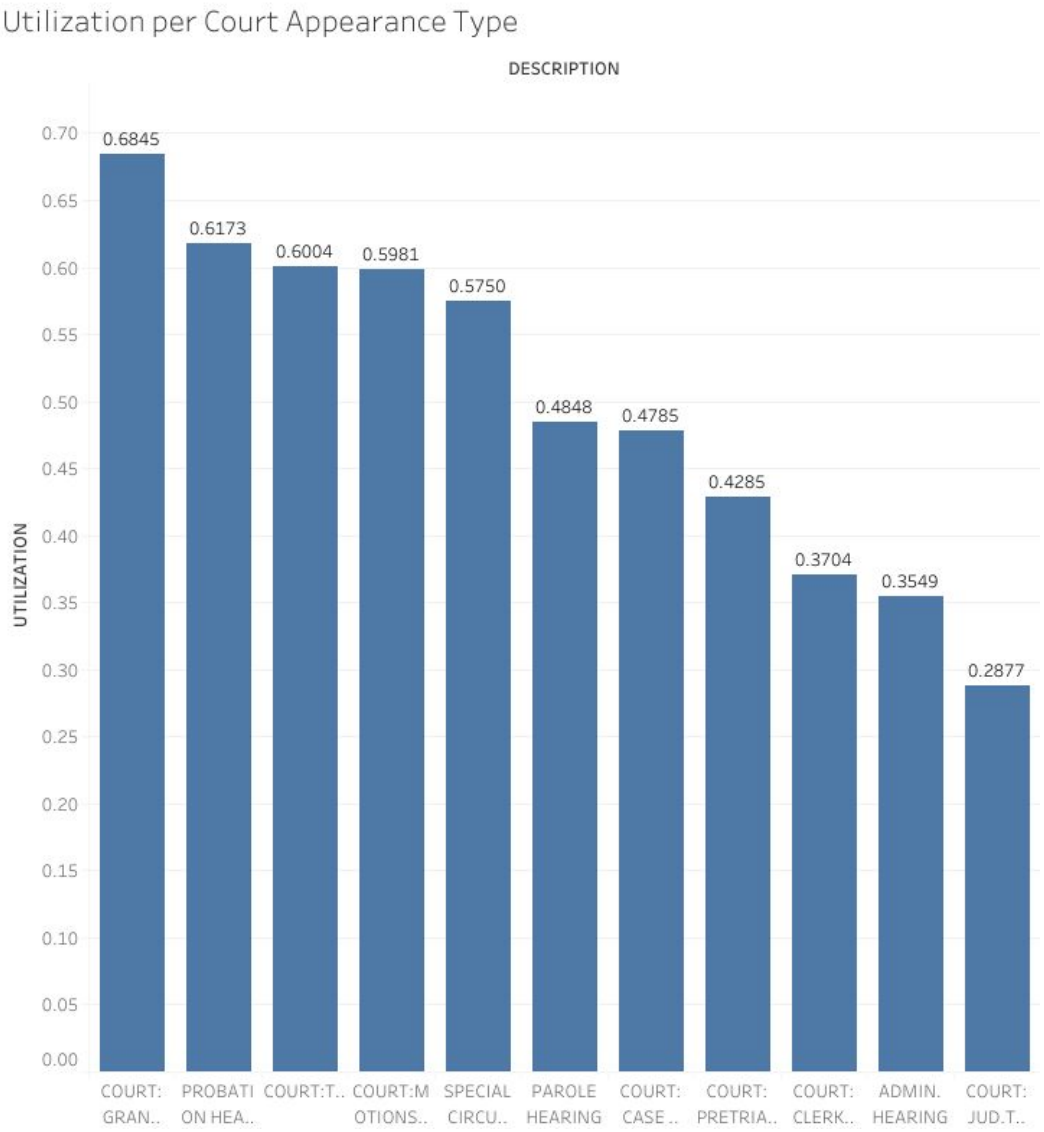
This visual shows the average and median amount of money officers in the BPD earned in 2019 based on their rank. This used publicly found information from the Boston Employee Earnings Report. The numbers at the top of each bar represent the count of individuals in the calculation.

Figure 5: Overtime Earnings as Percent of Total Earnings



Description: This visual shows the percentage of total income that came from overtime for officers in the BPD in 2019 based on their rank. This used publicly found information from the Boston Employee Earnings Report.

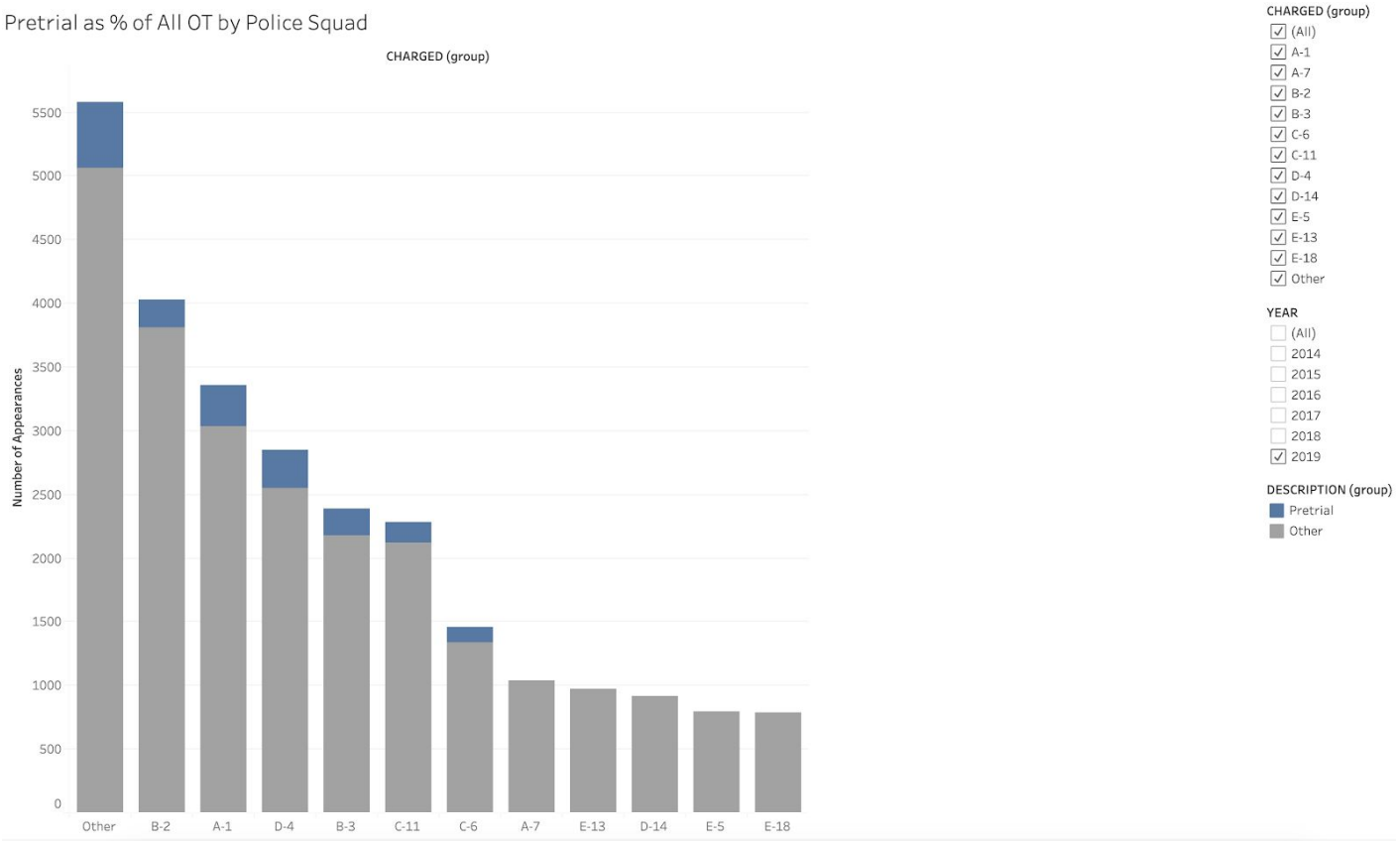
Figure 6: Utilization per Court Appearance Type



Description:

The utilization (found as Court OT hours worked over Court OT hours billed), listed by the type of court appearance, from highest utilization (least wasteful) to lowest utilization (most wasteful). Found in Tableau by calculating (‘WRKDHOURS’)/(‘OTHOURS’) and then filtering by (‘DESCRIPTION’).

Figure 7: Pretrial as % of OT by Police Squad

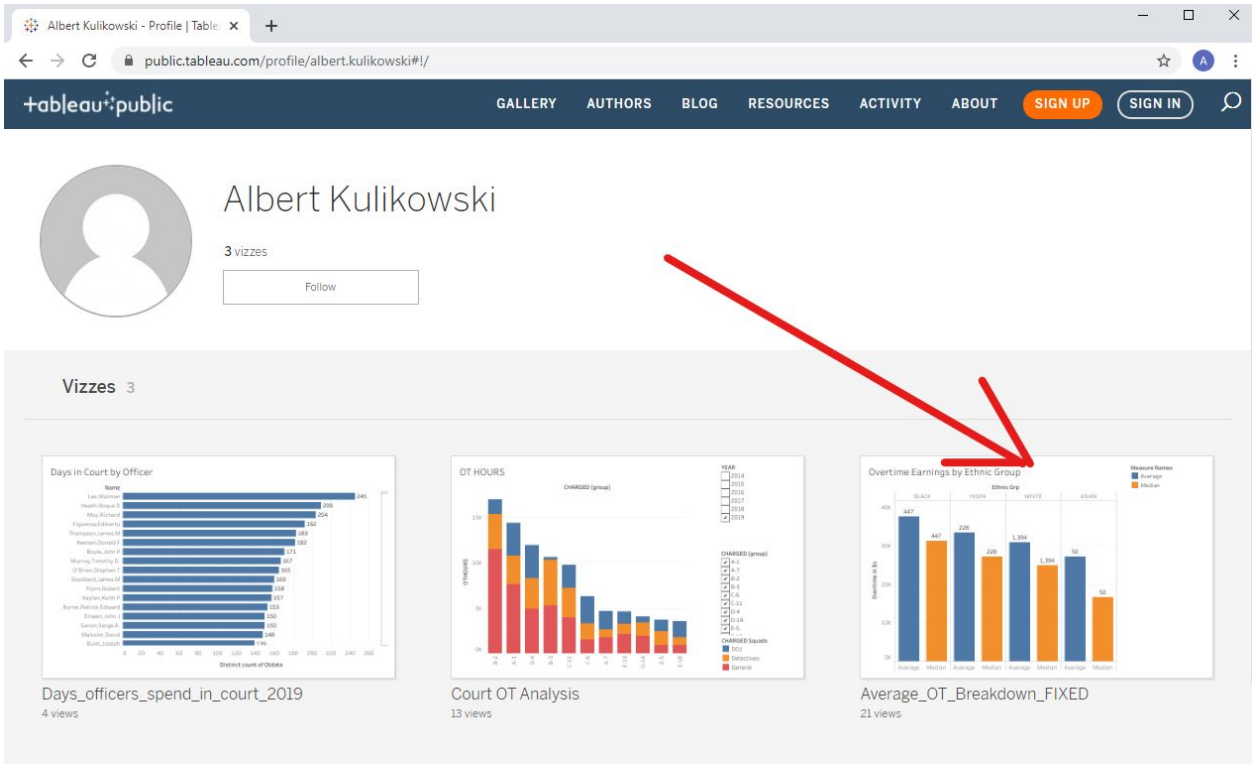


Description:

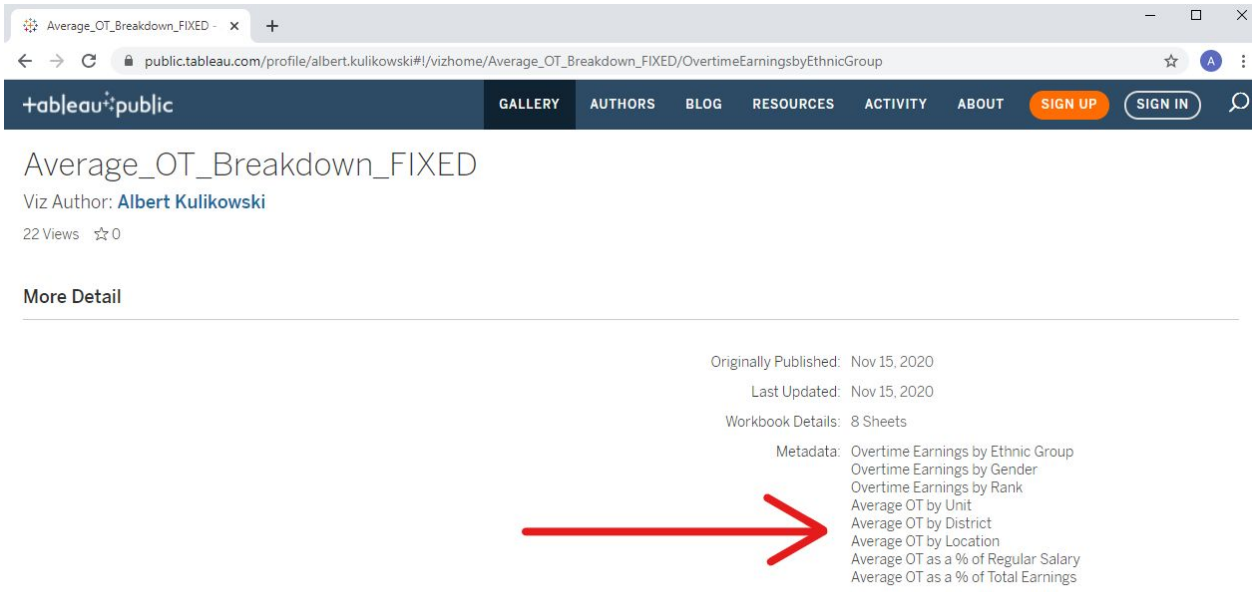
This visualization shows the number of court appearances by police squad, achieved by filtering the CHARGED category into groups based on the police squad they belonged to. The visualization was then made by using those groups as the x-axis, and using the count of court appearances on the y-axis, then color filtering the description of these appearances to display those appearances which were for pretrial.

Figure 8: How to navigate the visualizations

Visit the Tableau Public website of the group and select a Tableau Workbook



To see other views on the website, scroll down in the selected workbook and select a view from under Metadata



To download a Tableau packaged workbook and view the data and visualizations in Tableau, hover your mouse over the desired workbook, and click the orange button to download the workbook.