# Opinion Change or Differential Turnout: Austin's Budget Feedback Exercise and the Police Department

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## ABSTRACT

In 2020, the United States was shaken up by the murder of George Floyd at the hands of law enforcement and protests around the country intensified, asking for defunding or reallocation of police budgets. This happened in the middle of a budgeting feedback exercise for the City of Austin, where residents were able to share opinions on the budgets of various city service areas, including the Police Department. The number of daily responses increased by a hundredfold overnight and we find that the votes cast after the "exogenous shock" were overwhelmingly in favor of reducing police funding, redirecting those funds mostly to healthcare and housing. After we submitted a report describing the results from the 2020 exercise, the City published a new proposal that redirected a meaningful portion of the police budget, and the amount redirected was in line with the aggregated budget presented in the report.

In this paper, we present the data from the budget feedback exercise, and analyze the shifts in the respondent demographics that accompanied the exogenous shock. We also report on the results from a more limited budgetary feedback exercise in 2021, and a brief follow-up survey. This analysis suggests that the opinion shift that we observed around the shock is a structural change that persisted beyond 2020, and that the opinion gap on police funding widened. Finally, we show how clustering the opinions of the participant pool offers additional insights into the nature of the shift – the change in participation rates across different clusters after the shock was much more pronounced than changes across demographic groups. This has important potential consequences for how to take minority opinion into account in civic feedback processes.

## CCS CONCEPTS

• **Applied computing** → **Voting / election technologies**; • **General and reference** → *Empirical studies*; • **Human-centered computing** → *Visualization techniques*; • **Information systems** → Clustering.

## KEYWORDS

participatory budgeting, natural experiment, opinion change, police funding, clustering, minority representation

## 1 INTRODUCTION

The year 2020 was tumultuous in many regards for the relationship between cities in the United States and their residents. There was a tense countrywide political climate [3], the COVID pandemic changed how residents could interact with city governments, and several highly visible lethal confrontations between law enforcement and Black individuals resulted in an eruption of protest and demands for change. The police budget and organization came under varying degrees of scrutiny and there was also an increased interest in health and human services [28, 31].

One of the highly visible events was when George Floyd was killed in Minneapolis on May 25 by law enforcement officers, with shocking video footage that led to protests across the United States [6]. This happened in the middle of an online budget feedback exercise that we were running in partnership with the City of Austin, where Austin residents were asked to provide feedback on both the revenue and the expenditure side of the city budget – including the budget for the Austin Police Department. We observed a hundredfold increase in the number of daily responses to the budget feedback exercise and a shift in the amount of funding allocated by residents to different city functions. In line with econometrics literature, we will refer to the immediate aftermath of the murder on George Floyd as an "exogenous shock" to our exercise, turning our exercise into a natural experiment. We again partnered in the following year with Austin to run a scaled down version of the budget feedback exercise, accompanied by a short follow-up survey asking participants directly whether (and how) their opinion of police funding changed over the previous two years.

We produced summary reports for the city of Austin describing the outcomes of the exercises, including aggregated budgets. In 2020, in the wake of the protests and citizen engagement, the City announced a range of measures that had an impact on the budget of the Austin Police Department, including a cut of 11 million (2.5%) [18], which was in line with the aggregated budget in our report. In addition to the civic impact of our work, we believe that the nature

of the exogenous shock, the swift change in the modal response on the platform with respect to police funding, the clear importance of providing equitable voices to different segments of the city, and the fact that we repeated a similar exercise a year later make our data and analysis interesting from a research perspective as well. We focus on these research implications rather than a normative or policy-oriented analysis of the desirability of cuts in police funding.

## 1.1 Summary of Research Contributions and Findings

In this paper, we first describe the design of the budget feedback exercise and the timeline (section 2). This exercise was modeled after Participatory Budgeting elections [5, 24] in that participants were asked detailed questions about revenue items, and were asked to reallocate funding among different city functions and departments while keeping the budget balanced; knapsack aggregation [24] was used to aggregate the expenditure portion of the participant budgets.

We then present (section 3) the most salient aspects of our data. The raw daily votes, without demographic or identifying information, will be released along with the publication of this paper[1]. Given the unique nature of this natural experiment, we believe that this raw data is independently valuable, both to researchers who want to study broader social choice related issues of equitable voice and equitable participation, and to researchers who want to specifically understand resident sentiment towards police funding before and after the George Floyd murder.

Next, we analyze the data along multiple dimensions. A more complete description is in section 4, but we will briefly mention some important aspects here. Not surprisingly, in 2020 the opinion of the participants swung decisively towards a substantial reduction in police funding after the exogenous shock of George Floyd's murder. While the underlying issues with defunding the police were inextricably linked to racial justice, support for decreasing police funding was actually higher among White than among Black respondents and the slight decrease in White participants is not a viable explanation for the dramatic change in reported opinions after the shock. The age distribution changed significantly with the participant pool after the shock much younger than before. We perform cluster analysis of the opinion data and find robust clusters among the participants in 2020, Cluster analysis reveals a more nuanced picture of the participants who wanted to reduce police funding; we believe that such nuanced cluster analysis can lead to more informed and representative policy decisions.

One important question is whether the shift in 2020 in the modal response to the police funding after the shock was due to opinion change, a change in the composition of the participant population, or a mix of the two, and whether the opinion change (if any) was lasting. The second budgetary feedback exercise in 2021 and a follow-up survey provide useful insights. First, the demographic composition in 2021 was much closer to the demographic composition in 2020 before the shock. Second, the support for a further reduction in police funding (the baseline was in 2021 already reduced compared to 2020) was greater than support for any reduction in 2020 before the shock. Further, our follow-up survey

in 2021 suggests that there was a change in public opinion, and the differential outcomes before and after the shock in 2020 were not just the result of a temporary change in the participant turnout. The cluster analysis also allows us to compare the results of the follow-up budgeting survey in 2021 with the results from 2020 at a high level, and we find the cluster compositions to be qualitatively different.

As a disclaimer, we note that these are the results from one particular city, for one particular budgeting exercise, and may not be representative of the broader population in the United States; further, the dimensions along which we are concerned about equitable voice may differ across countries, and the optimum design of the budget interface may also depend on access to technology in the populations being surveyed. It is important to note that this was not a randomized study, and the participants were self-selected. Also, the results of the 2021 exercise were eliciting public opinion relative to a new baseline. Thus, while we believe that our results are salient, it is important to not over-generalize.

While we focus primarily on the data and its analysis in this paper, our work also makes multiple methodological contributions that can inform the design of future feedback exercises. It demonstrates that complex budget balancing processes can be done meaningfully by the general population of a city. Multiple cities are already using similar processes to collect feedback from their residents.[2] While a reduction in police funding was the most striking aspect of the aggregated budget, there was also substantive and useful information in how participants chose to reallocate police funding. Thus, the fact that each participant had to submit a response subject to budget constraints was a consequential design choice. The fact that these clear and robust clusters exist is an important finding for future high-dimensional civic feedback processes, and our approach to computing these clusters (normalizing along each axis and then running k-means) can serve as a useful starting point.

Our work also raises normative issues about representation and equity of voice in civic feedback processes. As opposed to elections (which generally are binding and conform to one person one vote), the results of this feedback exercise are advisory to the city, and allow for the possibility of the results being reweighted to give space for more equitable voice among demographic minorities which were underrepresented in the process, but the appropriate reweighting is far from obvious. The underlying normative issues of whether and how to do a reweighting along demographic lines, and when to instead rely upon a clustering based approach to identify "opinion minorities" deserve careful study. A quick conclusion based on a single civic feedback process such as ours would be unhelpful. But we do hope that our work will serve as one useful data point in a longer term and more comprehensive exploration of how to design civic feedback processes that are robust against disparities in the representation of demographic and opinion minorities.

## 1.2 Related Work

Citizen participation in government has a long history and can take many different forms, and since the Equal Opportunity Act of

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1964, mandated citizen participation has become a standard requirement in many federal initiatives in the United States[9]. Langton [29] classified citizen participation into the categories of electoral participation, citizen action (grass roots activism), citizen involvement ("initiated and controlled by the government"), and obligatory participation. We will focus here on citizen involvement, which is elsewhere also called public participation (expanding the scope beyond citizens). The anticipated impacts could be a way to better meet the needs of residents, an opportunity to build consensus and to improve public trust of the decision making process [9, 38]. In a 2001 survey of cities across the United States, Wang reported that 46% of the cities' chief administrative officers indicated that their citizens were involved with the budgeting process [38]. Calls to involve residents, stakeholders or citizens in the budgeting process are nothing new [14] and Ebdon found in 2002 [13] that a third of the cities in her sample actively sought citizen input, and a fifth on the entire operating budget – although (nearly) all cities use the traditional method of public hearings to some extent. Callahan concludes however that "public hearings do little more than inform the public" and that direct citizen participation (using a stricter definition) is not widely adopted by public administrators [8]. Ebdon and Franklin [14] identified public meetings, focus groups, budget simulations, citizen advisory committees and citizen surveys as mechanisms that can be engaged, all with their own advantages and constraints. The 2020 Austin budget feedback exercise that we're discussing in this paper was designed on the intersection between a budget simulation and a resident survey – taking advantage of an educational element but also as a way to determine preferences.

Perhaps one of the more empowering ways to get residents engaged in parts of the city budget has been budget allocation through Participatory Budgeting, a process that has been well described in the literature (e.g. [5, 19]). The process was introduced in Porto Alegre, Brazil, but has found a fertile soil in an estimated 7,000+ cities across the world [12]. Participatory processes such as Participatory Budgeting often have equitable representation as an explicit goal of the process [30]. Our feedback exercise is similar to Participatory Budgeting in terms of the user interface and the aggregation methods. But the goal of our exercise is to get constructive feedback on a proposed budget, whereas Participatory Budgeting processes are generally binding, making them similar to an election.

In an election, it would generally be unacceptable to reweight responses from different sub-populations to arrive at a more representative outcome. However, this method could be applied in feedback exercises such as ours to help the decision maker visualize potential alternative outcomes. A lot of progress has been made in identifying techniques to address the challenge of interpreting results of a non-representative or respondent-driven survey [23, 34, 39]. These methods assume access to instrumental variables that capture the under representation. Another approach is to design the survey from the start to be more representative, be it by using weighted advertising methods [21], adjusted survey design [7] or by adjusted sortition (for minipublics) [17].

Random or balanced population samples form the basis of deliberative polls [16] and can also be used in deliberative budgeting processes, requiring a smaller sample but more engagement, allowing for in-depth and more informed discussion and opinions [4, 40]. Increasingly, cities are using more complex voting methods

or feedback processes and with the further availability of online technology, novel methods can be implemented at more reasonable cost.

In recent years, commentators around the world have been surprised by sudden shifts in opinion polls, or by the fact that opinion polls did not reflect the eventual outcome during an election or referendum. While these polls of national elections have been shown to generally perform rather well [26], smaller polls and referendums like the Brexit referendum have resulted in surprises. In general these can be attributed to 5 factors: Actual change of opinion ('late swing'), differential turnout, swing voters behaving differently from determined voters, misstatement of opinion by polled citizens or non-representative samples [27, 33]. The change in opinion after the exogenous shock in our exercise raises similar questions about the cause and nature of the change.

Our work adds to recent literature that describes the effects of the killings of Black citizens by the police (such as of Ahmaud Arbery, Breonna Taylor and George Floyd) and the subsequent protests on the backdrop of a worldwide pandemic [11]. Previous work identified a shift in sentiment towards Black people on Twitter after all three killings, but most strongly after the murder on George Floyd [35]. Especially relevant are two studies that compare survey data before and after the murder on George Floyd and found unprecedented increase in anger and sadness levels among the US population beyond Minnesota [15], an increase in distress on police brutality among young people [25] and a shift in police favorability, where previous killings led to limited effects only [36]. This suggests that the intensity of protests and national outrage after the murder on George Floyd was fundamentally different from cases before - whether it is due to the nature of the murder or the combination with the ongoing pandemic.

## 2 THE BUDGET FEEDBACK EXERCISES: TIMELINE AND DESIGN

### 2.1 Timeline

Late 2019, the City of Austin budget office found itself restricted in its revenue sources while at the same time facing rapidly increasing expenses due to increased cost of living in the city. The General Fund revenue as reported by the City was $1.1 billion in FY2020 with the property tax (49%), sales tax (23%) and utility transfers (15%) being the main revenue sources. The City only had limited control over the size of these revenue sources due to a state-enforced ceiling on the revenue growth from property tax.

This meant that likely some tough budgetary choices would have to be made, and a more nuanced feedback exercise was designed early 2020 in collaboration with the authors to gauge resident input into this complex multi-dimensional question. The design was not much affected by Covid pandemic (other than an adjusted introduction) that was taking shape across the United States, but the importance of the exercise increased due to reduced opportunities for the City to collect feedback in-person from residents. The exercise was launched as a custom made website on May 1, 2020 and was initially supposed to be run for a month, but was extended to two months due to the limited availability of offline opportunities to provide input on the city budget and the peak in responses near the end of the original month. The website was advertised by the
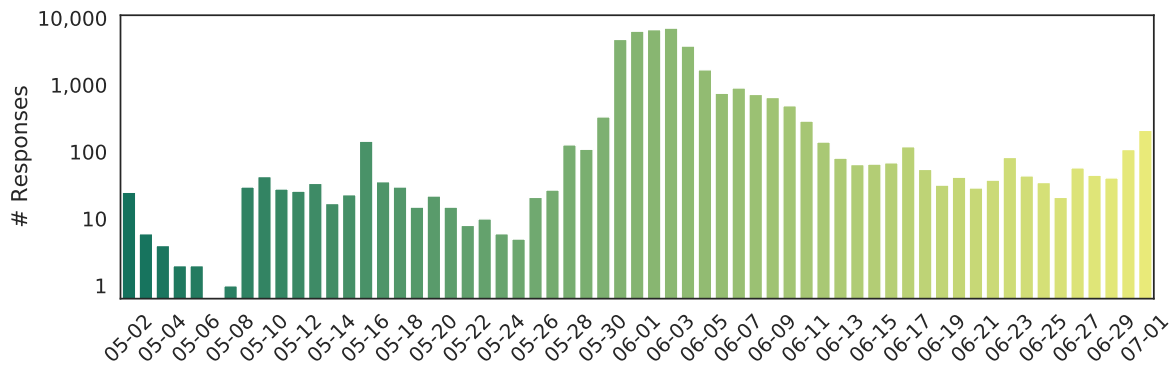
**Figure 1: Responses per day (2020) on a logarithmic scale**

city through its usual channels (social media, news letters and traditional media), with an additional effort to get a response from traditionally underrepresented areas and populations. The research team had no direct involvement in the advertising of the exercise.

On May 25, George Floyd was killed in Minneapolis, the outrage of which caused a spike in protests and criticism towards police funding across the country. This citizen engagement had its impact on the response rate (Figure 1): (often much) less than 100 daily responses were observed up to May 25, rapidly increasing to more than 1000 responses per day between May 31 and June 6. After June 10, the daily responses were still heightened, but at 98 per day on average. For convenience of analysis and presentation, we will split the responses in three non-overlapping segments: May 1-29 (segment 1), immediately after the exogenous shock May 29 - June 6 (segment 2), and June 6-30 (segment 3).

A technical report of the outcomes was prepared and a first draft was shared with City leadership mid June and a final report published on July 21 with an aggregated operating budget from the responses that reduced police funding with 3% [10]. In the wake of the protests and citizen engagement, the City announced a range of measures that impacted the budget of the Austin Police Department, including a cut of 11 million (2.5%) [18], which was in line with the reported outcomes of the exercise. The City Council eventually decided on a larger redistribution of the safety budget [37], which was mostly reverted in 2021 after new state legislation penalizing cities that cut their police budget [32]. In 2021, the collaboration was continued with a redesigned budget feedback exercise with 1237 respondents [22].

## 2.2 Design

The 2020 edition was designed to get input on two questions:

(1) If the City would have to increase revenue, what would be the support to increase property tax or service fees;
(2) If residents would be able to redistribute the budget between departments (zero sum), how would they do so.

The workflow was designed with three components: revenue, expenditure and demographic. In the revenue portion, residents were asked what their support was for increasing the property tax, and for which service area they would support a moderate or significant increase of fees in 9 service areas (e.g. aquatic fees

and golf fees). Because these service areas are often diverse, it was not possible to provide quantitative questions for these fees and they were posed qualitatively (see Fig. 2). The authentication was designed to be a very low threshold for participation, with self-certification that the respondent lived in the City of Austin and use of reCaptcha.

Next, respondents were presented with the current distribution of the General Fund across 11 city service areas (e.g. Austin Police Department and Emergency Medical Services) and asked to redistribute the budget between services in $250,000 increments (see Fig. 3). To ensure a realistic scenario, any respondent could not reduce the budget of any department by more than 5%, and in order to submit this section of the exercise, the respondent had to arrive at the same total. This budgeting under constraints provides a more holistic view of what the respondents are actually interested in. While this design was not originally set up as a referendum on the police budget, we did anticipate that the APD was likely a divisive budget item. This approach would provide a contextualized and consistent way of asking about the entire budget, even if the budget of the APD was of most interest to respondents.

Finally, respondents were presented with a set of demographic questions and a few open-ended opportunities to provide input or feedback.

In 2021, the design of the expenditure section was changed from a redistribution of budget to a five-point scale to only allow residents to indicate per service area whether they would support a significant or moderate decrease, no change or a moderate or significant increase of its budget. The service areas also reflected the new service areas of the city (most notably the Public Safety Support, which was split off from the Austin Police Department) and the exercise was due to its new design this time hosted on a popular off-the-shelf survey website.

In 2021, we also invited respondents to volunteer for a follow-up survey, where we asked them about their opinion on the Austin Police Department (APD) budget and to choose between three aggregated sets of preferences. We took the responses of 2021 and clustered the responses to get 3 scenarios for revenue, and 3 scenarios for expenditures from their respective centroids (removing the
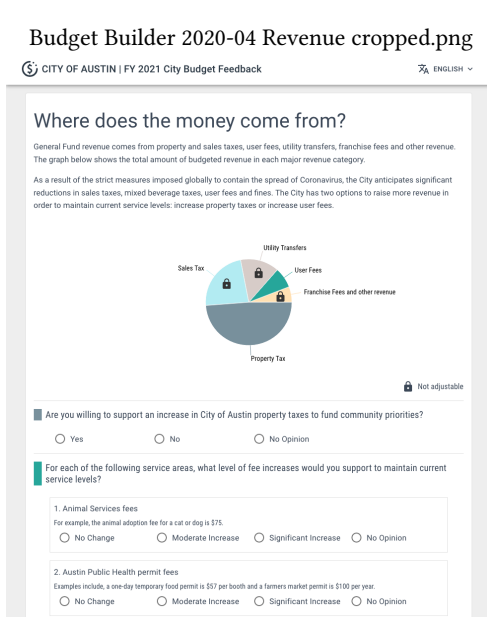
Budget Builder 2020-04 Revenue cropped.png



Figure 2: Design of revenue portion of the 2020 exercise.

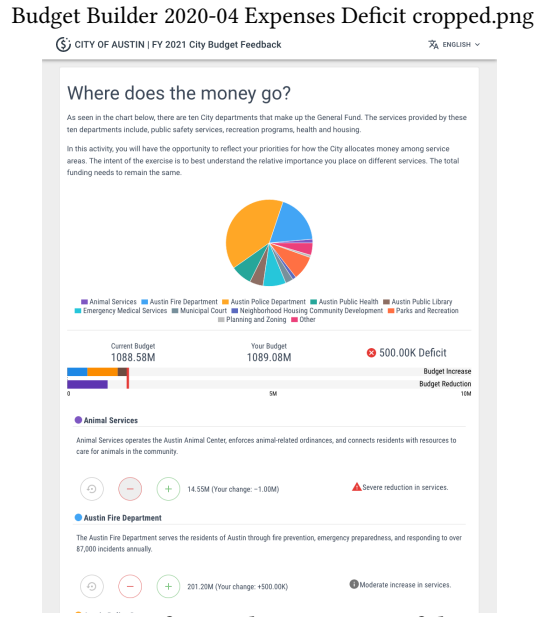Budget Builder 2020-04 Expenses Deficit cropped.png



Figure 3: Design of expenditure portion of the 2020 exercise.

items with general agreement between cluster centroids).[3] We presented these scenarios in randomized triplets and asked participants to provide their preferred order.

We first explained the changes made to the Austin Police Department budget in the ongoing financial year as explained on the City website[4], and asked whether they agreed with these changes in APD funding. We also asked whether their idea about the ideal size of the Police force has changed over the previous 1-2 years, and asked an open question as to what the most important event was from the past 1-2 years that changed their opinion on the APD budget. The exercise designs and the follow-up survey were approved by the Stanford University Institutional Review Board.

## 3 FEEDBACK EXERCISE OUTCOMES

We will briefly present the most salient outcomes of the two feedback exercises and the 2021 follow-up survey, before moving on to further analysis.

### 3.1 Outcomes 2020

The 2020 exercise received 37,006 responses up until July 1. Most notable demographic deviations from the American Community Survey (ACS) 2018 [1] or census data were an over/under representation of some districts, the proportion of respondents 18-34 years old (0.73 respondents, 0.30 ACS) and of respondents 55+ (0.035 respondents, 0.20 ACS).[5]

The aggregated results of the 2020 responses have previously been released in a technical report to the City management [10].[6] In summary:

- 50.1% of respondents (n=37,006) was willing to support an increase in property taxes (35.4% not willing to support, 14.5% no opinion)
- Out of the 9 service areas, there was in three areas a majority to support fee increases: golf fees, fire permit & inspection fees and planning and zoning fees. (n=37,004)
- For the expenditures (n=37,006), there was 59.8% support to reduce the budget of the police department with more than 3%, and 91.5% support for some reduction. This budget had then to be allocated to other service areas, resulting in increased budgets for almost all other departments. These budget preferences were then aggregated with knapsack aggregation which essentially finds a multi-dimensional median of all the submitted budgets subject to the budget-balance constraint [24]. The aggregated results, presented in Table 12, include a change of −3% for the Police Department, with the bulk of these funds being redirected to the Public Health, Emergency Medical Services and NHCD (Neighborhood Housing and Community Development).

### 3.2 Outcomes 2021

The 2021 exercise received 1525 valid responses.[7] The most visible deviations from the ACS 2019 [2] were the over/under representation of some districts, the proportion of respondents 18-24 years old (0.052 respondents, 0.10 ACS), the proportion of Latinx/Hispanic (0.10 respondents, 0.33 ACS) and White respondents (0.79 respondents, 0.49 ACS) and the proportion of renters (0.31 respondents,

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[3]The scenarios are available in the Appendix Section E

[4]https://www.austintexas.gov/news/austin-city-council-approves-fiscal-year-2020-2021-budget

[5]Tables in Appendix section A show the demographic distribution (gender, district, age, race/ethnicity, home ownership and income) of respondents.

[6]Tables with aggregated results are provided in the Appendix section B

[7]Demographic distribution of respondents is available in the Appendix section A

What Level Of Fee Increases Would You Support?
(n = 37004)

| | No change | Moderate increase | Significant increase |
|---|---|---|---|
| Animal Services Fees | 50.8% | 41.1% | 8.1% |
| Aquatic Fees | 63.3% | 30.4% | 6.3% |
| EMS Transport Fees | 87.5% | 8.0% | 4.5% |
| Facility Rental Fees | 54.6% | 37.2% | 8.3% |
| Fire Permit & Inspection Fees | 38.5% | 43.4% | 18.0% |
| Golf fees | 24.2% | 25.6% | 50.3% |
| Parks and Recreation Program Fees | 65.5% | 29.2% | 5.4% |
| Planning and Zoning Fees | 46.5% | 34.2% | 19.3% |
| Public Health Permit Fees | 58.6% | 34.9% | 6.4% |

**Figure 4: Responses per fee category, what level of fee increases (revenue) would be supported. Background color indicates size of support. Significant means 3% or more.**

What Service Level Changes Would You Support?
(n = 37006)

| | Significant reduction | Moderate reduction | No change | Moderate increase | Significant increase |
|---|---|---|---|---|---|
| Animal Services | 3.5% | 3.3% | 39.1% | 13.6% | 40.5% |
| Austin Fire Department | 1.7% | 7.3% | 47.5% | 42.6% | 1.0% |
| Austin Police Department | 59.8% | 31.7% | 4.9% | 3.4% | 0.1% |
| Austin Public Health | 0.5% | 1.2% | 9.8% | 31.3% | 57.3% |
| Austin Public Library | 1.3% | 3.5% | 27.2% | 35.0% | 33.0% |
| Emergency Medical Services | 0.4% | 1.4% | 25.5% | 46.1% | 26.5% |
| Municipal Court | 6.0% | 6.6% | 51.4% | 16.6% | 19.4% |
| NHCD | 2.3% | 1.6% | 14.6% | 6.9% | 74.5% |
| Other | 3.6% | 7.8% | 55.4% | 22.6% | 10.6% |
| Parks and Recreation | 0.9% | 3.5% | 30.8% | 49.8% | 15.1% |
| Planning and Zoning | 7.4% | 6.9% | 56.2% | 7.9% | 21.6% |

**Figure 5: Responses per service category, what level of expenditure increases would be supported. Background color indicates size of support. Significant means 3% or more.**

0.47 ACS). These proportions are much more similar to the respondents from before the exogenous shock, than after.

The aggregated results of the 2021 responses have previously been released in a technical report to the City management [22].[8] In summary:
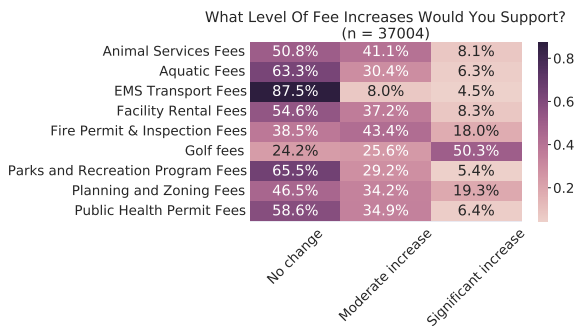
- 28% of the respondents (n=1525) indicated a support for an increase in property taxes (65% no support, 7% no opinion)
- Only for three service areas, a majority of respondents supported an increase in service fees: Golf Fees, Fire Permit & Inspection Fees and Facility Rental Fees. (n=1525)
- For the expenditures (n=1400), the questions changed compared to 2020. The proposed budget was significantly different (with 'Public Safety Support' split off from the Police budget) and the question no longer had an internal balance constraint. The police budget saw 33% support for significant decrease and 28% for significant increase. A similar split (with more support for increase) was on the opinions regarding Public Safety Support.
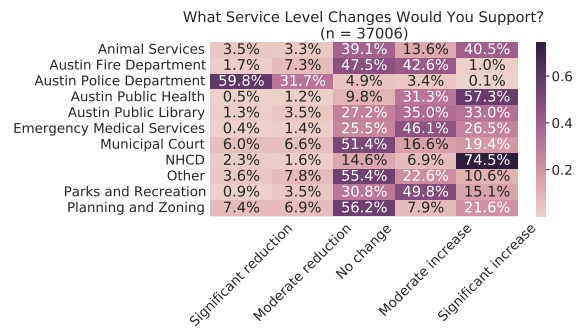
## 3.3 Follow-up Survey

The 2021 follow-up survey received 204 responses, of which 163 were matched to the 2021 exercise. 40% of the respondents (n=198) indicated that they agreed with the APD budget changes, while an additional 29% indicated that the change was in the right direction; 31 % indicated that the Police needed more funding, not less. The respondents that said that their ideal size is larger than before (25%), also mostly indicated that APD needed more funding, the respondents that said their ideal size didn't change (34%) were centered around agreement with the changes and respondents that said that ideal size is smaller than before (40%) were split between agreement with changes, and wanting larger changes (n=196).[9]

We asked respondents to rank three different aggregated revenue and expenditure scenarios in order to determine persistence of opinion. When comparing the revenue scenarios (n=127), 47% selected scenario rev-B (moderate increase of most service fees, but not of the property tax) as their first choice, and on the expenditure

side (n=135), 59% selected scenario exp-A (significant decrease of APD budget, moderate increase for most other areas).[10]

## 4 ANALYSIS

### 4.1 Shift effect

After observing the jump in responses (see Fig. 1), we first established that this was not due to illegitimate responses by inspecting the open-ended responses and user agent strings, as well as IP-addresses used for submission. We observed a level of variation that is contradictory with a small number of respondents responding many times. We verified that responses were mostly from residents: in the demographic questions, 3% entered a zip code that was not associated with the city, and 76% of the respondents provided a valid combination of city council district number and zip code, if both questions were answered. 70% of the responses could be mapped to Austin through IP address, and 95% to Texas. Some imperfect mapping is to be expected, and thus gives no reason to expect that the increase could be explained by responses submitted by people who did not live or work in Austin. These signals suggest that the submissions were likely manual and primarily made by the target audience.

News coverage of the budget feedback exercise was rather limited, but there is some evidence of social media posts getting traction. For example we were able to find some activity on Twitter, with the tweet with largest reach was retweeted 700 times and many tweets were identified with a smaller reach, many using a slightly different screenshot of the exercise website. This is consistent with the image that the peak was unlikely caused by a single organizer and more likely by a broader interest in the topic of the exercise once word got out about the exercise being organized on behalf of the City, grasping at an opportunity to provide a signal to the City – even as the possibility that some organized external effort was performed to attract a specific audience to the exercise, cannot be entirely excluded.

The most visible shift in demographics is that participants in segment 2 were younger and more likely to rent their home, rather

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[8]Tables with aggregated results are provided in the Appendix section C
[9]We refer to Table 1 for more detail.

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[10]We refer to Table 25 in the Appendix for more detail.

**Table 1: Cross tabulation "Do you currently agree with [the APD budget] changes" and "In the last 1-2 years, has your idea of the ideal size of the police force changed".** $\rho = -0.37, p = 0.000$

| Agreement with current changes | No, the Police needed more funding, not less | No, the change was in the right direction, but too much | Yes, I agree | No, the changes were in the right direction, but it was not enough |
|---|---|---|---|---|
| Opinion on size police force changed in the past 1-2 years | | | | |
| Yes, I now believe that the ideal size is larger | 40 | 5 | 4 | 0 |
| No, my opinion is about the same | 16 | 13 | 33 | 5 |
| Yes, I now believe that the ideal size is smaller | 4 | 6 | 41 | 28 |

than to own it. The most eye catching opinion shift is in the expenditures[11]: the support for increasing the Police budget drops from 22% to 3% and the support for decreasing the budget increases from 43% to 93%, with the other departments seeing an expected support for increased budget due to the balanced expenditure requirement. At the same time, we observe a decrease in support for increased service fees across the board (e.g. support for increasing Facility Rental Fees going from 67% to 40%) and support for a property tax increase, increased from 41% to 52%. The responses in segment 3 bounce back to a limited extent in the direction of segment 1.

There is a shift in opinions on increased service fees between segments 1 and 2. However, when service areas are sorted by their support within a time segment, the service fees at the top (most support to increase: golf fees and fire permit & inspection fees) and bottom (least support: EMS transport fees) don't change within the segments, or between years. The knapsack-aggregated budget from before the exogenous shock was identical to the default budget proposed by the city, but in segment 2 and 3, this aggregated to a budget reduction for the police department of 2.99% ($13 million), and the budget was distributed over other departments.

While there are clear distinctions in responses between the segments, it is not obvious whether the opinion shift is caused by a shift in turnout rates (people with one opinion, or people with another opinion), or whether societal opinion shifted. We will try to address this with the follow-up survey analysis.

## 4.2 Responses across demographics

A first step is to inspect whether the demographics shifted in a meaningful way between segment 1 and 2. As far as meaningful shifts happened, they happened in the direction of the demographic distribution of the city, sometimes overshooting the ACS. Gender and race ratios saw with limited shifts, but some demographic shifts were notable:

- Individuals with a household income of less than $35,000 went from 12% to 23% (ACS: 23%)
- Renters went from 36% to 66% (ACS: 50%)
- Participants 18-24 year old went from 3% to 30% (ACS: 11%), 25-34 year old went from 28% to 46% (ACS: 23%)

- Some shifts in districts (suburban district 8 went from 10% to 5%, while inner city district 9 went from 8% to 15%)

Participants in segment 2 were younger, had a lower income and were more likely to rent than people who participated in segment 1. In segment 3, these demographics return more to levels of segment 1, but not quite. In 2021, the participation of young people, renters and lowest income mostly return to that of segment 1.

Splitting out the responses by demographics gives some useful insights. For example, we observe that the support for property tax increases varies by age (18-24 years old: 54% support, 75+: 18%) and home ownership (home owners 45%, renters 54%), that the support for increasing service fees varies with age (younger groups support increases less across the board) and much less with home ownership or race. Also on the expenditure side, age is a meaningful demographic with more support to reduce police funding among young respondents, while there seems little connection with race and some connection with home ownership.

To verify whether the shift in opinions before and after the exogenous shock could be explained by a different demographic turnout, we aggregated the responses in all three time segments, reweighted by age, home ownership or race/ethnicity to match distributions in the ACS. We still see similar meaningful shifts across the board in these adjusted aggregates.[12]

## 4.3 Cluster analysis

Because we could not satisfactorily explain the effects of the exogenous shock with demographics, we clustered the responses as a different approach to analyze the results. We converted the responses to the individual service-area based revenue and expenditure questions to numerical responses and normalized them by dividing by the standard deviation for each sub question. We used KMeans clustering since it is one of the most common methods to cluster high-dimensional data [41]. We configured the algorithm to find three clusters in our data (98.6% average accuracy: same cluster label assigned to a response after resampling and reclustering) and added the labels to our dataframe. We repeated the same for 2021 data (96.7% average accuracy). We tried 2, 3 and 4 clusters, and for this dataset the setting with 3 clusters provides the sharpest insights

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[11]See Appendix Section D for outcomes split out by segment.

[12]As age is the biggest difference, we made age-adjusted numbers available in Tables 19 – 24 in the Appendix
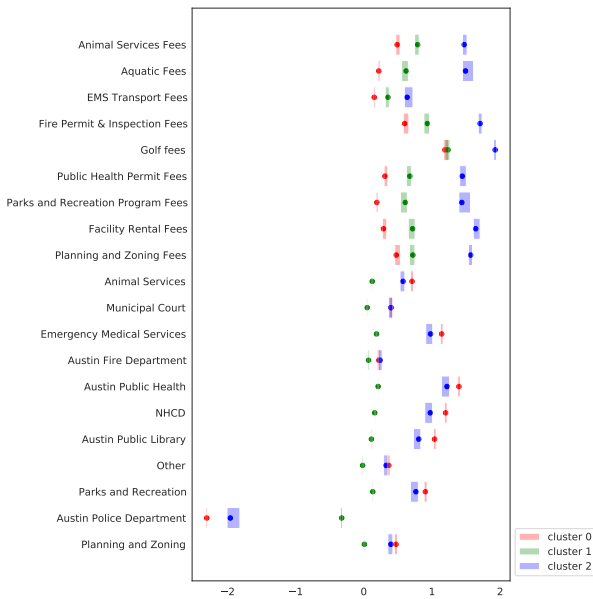
**Figure 6: 3 cluster-centroids (2020) with their normalized budget shift per service area, for 3 clusters with 0.95 confidence interval**
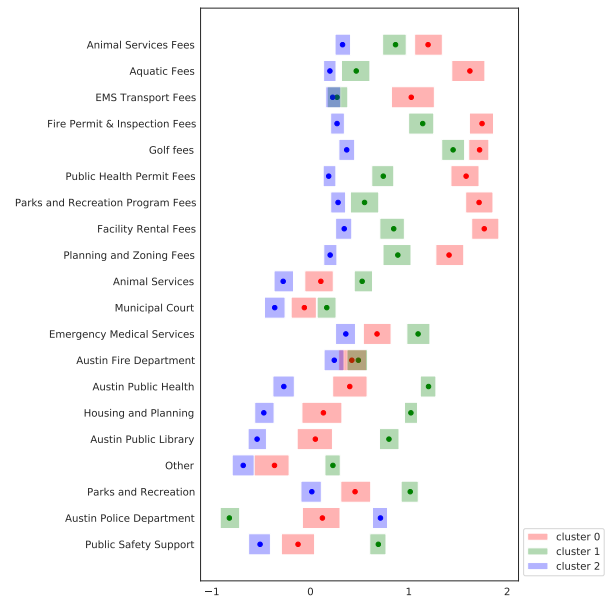


**Figure 7: 3 cluster-centroids (2021) with their normalized budget shift per service area, for 3 clusters with 0.95 confidence interval**

and picture. In Fig. 6 and 7 we show the mean of the normalized scores for each of the clusters and its centroids' 95% confidence interval for 3 clusters. The centroids of both 2020 and 2021 clusters are robust to resampling and reclustering. A clustering with 2 clusters provides a wider confidence interval for 2020 data, and the centroid confidence intervals of 4 clusters are less well separated.[13]

The proportions of the different clusters over time (see Fig. 8) show that cluster 2020-1 dominates among early participants, and cluster 2020-0 only appears just before the exogenous shock and being somewhat more represented immediately after the exogenous shock, and a mostly even mix of the three clusters after.

When we inspect the mean opinions per cluster, we see three profiles of voters arise in 2020 data:

- Cluster 2020-0 respondents are least supportive of increasing service fees, are most in favor of reducing police funding, and also increasing the funding of other departments. These respondents are generally younger and more likely to rent their home.
- Cluster 2020-1 respondents are least supporting of decreasing police funding or increasing the tax rate, and are more moderate on service fees. These respondents are generally older.
- Cluster 2020-2 respondents are supportive of meaningful reduction of police funding, but also supportive of increasing service fees and property tax.

We should remind ourselves that the setup changed in 2021: the status quo is now that the police funding has already been partially diverted in a safety fund, but there is also no longer a requirement to balance the budget. We now find these cluster profiles:

[13]For reference we have included the equivalent figures for 2 and 4 clusters in the Appendix.

- Cluster 2021-0 respondents are most supportive of increasing service fees, and are moderate on changing expenditure or increasing property tax. These respondents are more likely to be older.
- Cluster 2021-1 respondents are most supportive of further reducing the police funding and increasing the budget of other departments, and have different opinions on increasing service fees, depending on the service area. They are most supportive of increasing the property tax. These respondents are more likely to be younger, female and to rent their home.
- Cluster 2021-2 respondents are most supportive of increasing police funding, and reducing the budget of other departments (or increase them less), while also being least supportive of increasing service fees and property tax. These respondents are more likely to be older and to be male.

There are some parallels between these two sets of cluster characteristics. Clusters 2020-1 and 2021-2 have in common the relative support for police funding, the relatively low support for funding other departments (in 2020, this might have been caused by the question setup, in 2021 this was not the case) and the relatively low support for property tax increase. If we however look at the cluster in 2021 that was least supportive of police funding (2021-1), we see some parallel with both 2020-0 and 2020-2: relatively high support for funding other departments, relatively high support for property tax increase. However, when we look at the fee increases on the revenue side of the budget, this parallel breaks down: in 2020 one of the clusters was most supportive of increasing fees, while the other was least supportive. In 2021, this seems to have merged together in a single cluster that supports increasing some fees much more than others. This is in line with the picture that the turnout of people
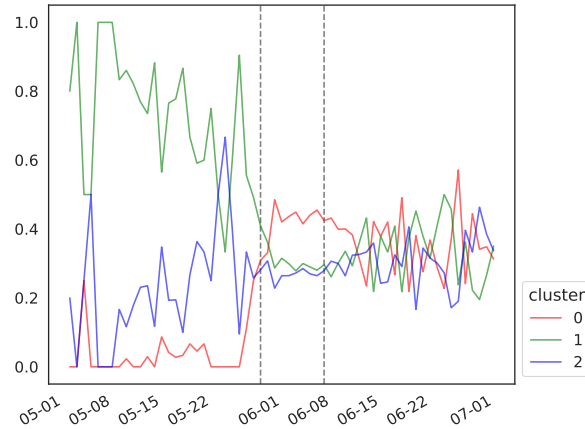
**Figure 8: Proportion of respondents per cluster, per day for 2020. The vertical dashed lines show the boundary between time segments.**

who supported reducing police funding in a meaningful way was much higher in 2020 than in 2021.

At a high level, we can conclude that we find robust respondent profiles that may be helpful for the decision maker. While there are some parallels between 2020 and 2021 clusters, it is thanks to changes in survey setup and society unrealistic to expect that the cluster profiles will match from year to year.

### 4.4 Follow-up Survey

In the follow-up survey, we asked whether respondents currently agreed with the changes made to the police budget and split out the responses by cluster in Table 3. These preferences are consistent with the cluster centroids in the 2021 clustering.

We also asked respondents how their opinion of the ideal size of the police force changed over the past 1-2 years, and find a correlation with their agreement to the implemented APD budget changes (See Table 1). Respondents who want more funding for the police, also believe that their ideal Police force is now larger than before, and vice versa. In other words: most of the respondents that have the most extreme opinions with regards to police funding, have developed or reinforced that opinion over the past 1-2 years.

**Table 2: Count of preferred scenario by respondents in follow-up survey, split by 2021 cluster. The clusters are significant for scenario preference with $p = [0.04, 0.00, 0.00]$, using a $\chi^2$ test comparing to the overall (unclustered) response distribution.**

| | Revenue scenarios | | | Expenditure scenarios | | |
|---|---|---|---|---|---|---|
| | rev-A | rev-B | rev-C | exp-A | exp-B | exp-C |
| cluster label | | | | | | |
| 0 | 9 | 19 | 2 | 15 | 12 | 8 |
| 1 | 5 | 28 | 24 | 48 | 4 | 1 |
| 2 | 17 | 5 | 3 | 7 | 14 | 6 |
| Total | 31 | 52 | 29 | 70 | 30 | 15 |

In Table 2 we show for each 2021 cluster what the count of preferred scenarios[14] was. We observe that preferences are in line with the cluster centroids in the original 2021 clustering. We also analyzed the data from the question about agreement with the change in police budget (Table 3), which is consistent with the cluster centroids from the 2021 feedback exercise.

## 5 CONCLUSIONS AND FUTURE WORK

It will come as no surprise for people who follow the politics of Austin, that the budget allocation for the Police Department is a divisive issue. This was already the case before the exogenous shock with 26% support to increase and 43% support to decrease the same budget item; this is even more the case in 2021 with 41% supporting an increase (28% a significant increase) and 45% supporting a decrease (33% a significant decrease) of the Police budget. After the budget changes by the City Council in 2020, the analysis of the 2021 follow-up survey shows that a large majority (70%) could agree with the direction of these reforms, even if they didn't necessarily agree on the extent.

We observed that Cluster 2020-1 (the only cluster not in favor of reducing police funding) dominated the responses before the exogenous shock, while after the shock the three clusters were much more balanced. This suggests that either respondents from clusters 2020-0 and 2020-2 did barely participate before the exogenous shock, or that there was an actual shift in opinion. We also observed that the 2021 demographics of respondents mostly $\chi$ returned back to those of segment 1 in 2020 and recall that the status quo had changed: the police budget had been reduced significantly, and been partially redirected to a Safety Fund. However, when we cluster opinions in 2021, we find a cluster that wanted to further reduce police funding, while clusters with that opinion were barely present in 2020 segment 1 (only 12% of respondents in 2020 segment 1 wanted to reduce the police budget significantly). This suggests a lasting shift in opinion with regards to police funding.

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[14]A detailed description of the content of each scenario is available in Appendix Section E.

**Table 3: Count of follow-up survey respondents by agreement with police budget change and cluster. Clusters are significant with $p = [0.04, 0.00, 0.00]$, using $\chi^2$ test comparing to the overall (unclustered) response distribution**

| cluster | No, the Police needed more funding, not less | No, the change was in the right direction, but too much | Yes, I agree | No, the changes were in the right direction, but it was not enough |
|---------|------|------|------|------|
| 0 | 22 | 8 | 14 | 4 |
| 1 | 2 | 9 | 45 | 26 |
| 2 | 26 | 5 | 6 | 1 |
| Total | 50 | 22 | 65 | 31 |

We compared the 2021 cluster assignments with the responses in the follow-up survey, and conclude that the clusters capture persistent opinions. The follow-up survey also finds that in 2020/2021 the respondents that believe the police needs more funding, believe the ideal size of the Police to be larger than before, and the respondents that believe further reductions were warranted, have developed their views in the opposite direction. While there seems to have been a strong shift to reducing police funding in 2020, in 2021 the opinion gap seems to be widening.

Finally, we observed a correlation in the follow-up survey between the opinion at that time of respondents with regards to the changes in police funding, and how they indicate that their opinion on the ideal size of the police force has changed over the past 1-2 years. This suggests that the opinion gap on the police budget is widening or reinforcing.

Police reform is a complex issue, and depends on more than just the size of the police budget. In order to really understand this kind of opinion change, it would be beneficial to dig deeper with a qualitative study that would be able to identify motivations. Further nuance could also be captured by different exercise designs, such as more detailed outlines of consequences of budget choices, or a deliberation through a mini-public.

While we have uncovered indications that there was an opinion shift on police funding, a more conclusive and generalizable approach is to track a panel of respondents over the course of several years. Not only would this generate valuable insights on how these opinions change, it would also indicate how stable opinion clusters are over time.

With this paper, we're publishing a data set of responses to both feedback exercises (2020 and 2021) and the follow-up survey [20]. We rounded the timestamps to days, randomized the order within the days and selected all subjective closed questions for this data set. We believe this data may prove useful in future research on exogenous shocks.

## ACKNOWLEDGMENTS

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## A DEMOGRAPHICS

## B OUTCOMES 2020

**Table 4: Gender distribution**

| Gender | 2018 ACS | 2020 seg 1 | 2020 seg 2 | 2020 seg 3 | 2021 |
|--------|----------|------------|------------|------------|------|
| Female | 0.496 | 0.622 | 0.612 | 0.625 | 0.530 |
| Male | 0.504 | 0.345 | 0.337 | 0.340 | 0.432 |
| Other | | 0.033 | 0.051 | 0.035 | 0.038 |

**Table 5: District distribution**

| District | 2010 Census | 2020 seg 1 | 2020 seg 2 | 2020 seg 3 | 2021 |
|----------|-------------|------------|------------|------------|------|
| District 1 | 0.097 | 0.143 | 0.159 | 0.140 | 0.102 |
| District 2 | 0.1 | 0.077 | 0.051 | 0.048 | 0.069 |
| District 3 | 0.1 | 0.104 | 0.099 | 0.093 | 0.081 |
| District 4 | 0.099 | 0.064 | 0.065 | 0.063 | 0.082 |
| District 5 | 0.102 | 0.075 | 0.082 | 0.105 | 0.140 |
| District 6 | 0.103 | 0.052 | 0.043 | 0.051 | 0.053 |
| District 7 | 0.101 | 0.103 | 0.087 | 0.103 | 0.112 |
| District 8 | 0.097 | 0.101 | 0.046 | 0.065 | 0.095 |
| District 9 | 0.099 | 0.085 | 0.149 | 0.135 | 0.136 |
| District 10 | 0.101 | 0.107 | 0.070 | 0.088 | 0.118 |
| Other | - | 0.090 | 0.150 | 0.108 | 0.012 |

**Table 6: Age distribution**

| Age Group | 2018 ACS | 2020 seg 1 | 2020 seg 2 | 2020 seg 3 | 2021 |
|-----------|----------|------------|------------|------------|------|
| 18- | 0.197 | - | 0.016 | 0.014 | |
| 18-24 | 0.105 | 0.034 | 0.304 | 0.167 | 0.052 |
| 25-34 | 0.227 | 0.283 | 0.457 | 0.431 | 0.292 |
| 35-44 | 0.156 | 0.246 | 0.155 | 0.223 | 0.266 |
| 45-54 | 0.119 | 0.198 | 0.044 | 0.087 | 0.177 |
| 55-64 | 0.103 | 0.14 | 0.017 | 0.048 | 0.106 |
| 65+ | 0.094 | 0.098 | 0.008 | 0.030 | 0.107 |

**Table 7: Race/Ethnicity distribution**

| Race/Ethnicity | 2018 ACS | 2020 seg 1 | 2020 seg 2 | 2020 seg 3 | 2021 |
|----------------|----------|------------|------------|------------|------|
| Asian alone | 0.076 | 0.030 | 0.074 | 0.068 | 0.050 |
| Black/African American alone | 0.081 | 0.022 | 0.028 | 0.033 | 0.045 |
| Latinx/hispanic | 0.327 | 0.181 | 0.202 | 0.183 | 0.104 |
| Other/multiple races | 0.038 | 0.029 | 0.040 | 0.036 | 0.011 |
| White alone | 0.488 | 0.738 | 0.656 | 0.680 | 0.790 |

**Table 8: Home Ownership distribution**

| Home Ownership | 2018 ACS | 2020 seg 1 | 2020 seg 2 | 2020 seg 3 | 2021 |
|----------------|----------|------------|------------|------------|------|
| Own | 0.479 | 0.64 | 0.341 | 0.48 | 0.682 |
| Rent | 0.499 | 0.36 | 0.659 | 0.52 | 0.318 |

**Table 9: Income distribution by time segment**

| Income Group | 2018 ACS | 2020 seg 1 | 2020 seg 2 | 2020 seg 3 | 2021 |
|---|---|---|---|---|---|
| $ 35k or less | 0.226 | 0.118 | 0.235 | 0.148 | 0.091 |
| $ 35-100k | 0.408 | 0.462 | 0.451 | 0.444 | 0.434 |
| $ 100-150k | 0.170 | 0.227 | 0.168 | 0.202 | 0.218 |
| $ 150k or more | 0.197 | 0.193 | 0.147 | 0.206 | 0.257 |

**Table 10: Preferred Fee Change per Category, 2020**

| Fee Category | No change | Moderate increase | Significant increase |
|---|---|---|---|
| Animal Services Fees | 0.508 | 0.411 | 0.081 |
| Aquatic Fees | 0.633 | 0.304 | 0.063 |
| EMS Transport Fees | 0.875 | 0.080 | 0.045 |
| Facility Rental Fees | 0.546 | 0.372 | 0.083 |
| Fire Permit & Inspection Fees | 0.385 | 0.434 | 0.180 |
| Golf fees | 0.242 | 0.256 | 0.503 |
| Parks and Recreation Program Fees | 0.655 | 0.292 | 0.054 |
| Planning and Zoning Fees | 0.465 | 0.342 | 0.193 |
| Public Health Permit Fees | 0.586 | 0.349 | 0.064 |

**Table 11: Preferred Budget Change per Service Area, 2020**

| Service Area | Significant reduction | Moderate reduction | No change | Mod. increase | Sign. increase |
|---|---|---|---|---|---|
| Animal Services | 0.035 | 0.033 | 0.391 | 0.136 | 0.405 |
| Austin Fire Department | 0.017 | 0.073 | 0.475 | 0.426 | 0.010 |
| Austin Police Department | 0.598 | 0.317 | 0.049 | 0.034 | 0.001 |
| Austin Public Health | 0.005 | 0.012 | 0.098 | 0.313 | 0.573 |
| Austin Public Library | 0.013 | 0.035 | 0.272 | 0.350 | 0.330 |
| Emergency Medical Services | 0.004 | 0.014 | 0.255 | 0.461 | 0.265 |
| Municipal Court | 0.060 | 0.066 | 0.514 | 0.166 | 0.194 |
| NHCD | 0.023 | 0.016 | 0.146 | 0.069 | 0.745 |
| Other | 0.036 | 0.078 | 0.554 | 0.226 | 0.106 |
| Parks and Recreation | 0.009 | 0.035 | 0.308 | 0.498 | 0.151 |
| Planning and Zoning | 0.074 | 0.069 | 0.562 | 0.079 | 0.216 |

**Table 12: Aggregated City Budget from responses, 2020**

| Service Area | Original Budget | Proposed Change | Change% |
|---|---|---|---|
| Austin Police Department | 434,475,745.00 | -13,000,000.00 | -2.99% |
| Austin Fire Department | 200,701,475.00 | +250,000.00 | +0.12% |
| Parks and Recreation | 98,394,261.00 | +1,000,000.00 | +1.02% |
| Emergency Medical Services | 93,068,228.00 | +2,000,000.00 | +2.15% |
| Austin Public Health | 85,926,146.00 | +4,750,000.00 | +5.53% |
| Austin Public Library | 54,685,661.00 | +1,250,000.00 | +2.29% |
| Other | 49,699,345.00 | - | - |
| Municipal Court | 31,510,968.00 | - | - |
| Animal Services | 15,552,062.00 | +500,000.00 | +3.22% |
| NHCD | 14,829,857.00 | +3,250,000.00 | +21.92% |
| Planning and Zoning | 9,732,705.00 | - | - |

## C  OUTCOMES 2021

## D  OUTCOMES OVER TIME

**Table 13: Preferred Fee Change per Service Area, 2021**

| Fee Category | No change | Moderate increase | Significant increase |
|---|---|---|---|
| Animal Services Fees | 0.556 | 0.353 | 0.091 |
| Aquatic Fees | 0.631 | 0.305 | 0.064 |
| EMS Transport Fees | 0.794 | 0.160 | 0.046 |
| Facility Rental Fees | 0.462 | 0.407 | 0.131 |
| Fire Permit & Inspection Fees | 0.407 | 0.423 | 0.170 |
| Golf fees | 0.351 | 0.311 | 0.338 |
| Parks and Recreation Program Fees | 0.569 | 0.358 | 0.072 |
| Planning and Zoning Fees | 0.537 | 0.280 | 0.183 |
| Public Health Permit Fees | 0.559 | 0.359 | 0.082 |

**Table 14: Preferred Budget Change per Service Area, 2021**

| Service Area | Significant decrease | Moderate decrease | No change | Moderate increase | Significant increase |
|---|---|---|---|---|---|
| Animal Services | 0.074 | 0.102 | 0.499 | 0.261 | 0.065 |
| Austin Fire Department | 0.040 | 0.065 | 0.481 | 0.343 | 0.071 |
| Austin Police Department | 0.326 | 0.130 | 0.139 | 0.125 | 0.281 |
| Austin Public Health | 0.078 | 0.081 | 0.268 | 0.322 | 0.251 |
| Austin Public Library | 0.095 | 0.115 | 0.427 | 0.258 | 0.105 |
| Emergency Medical Services | 0.016 | 0.034 | 0.411 | 0.374 | 0.165 |
| Housing and Planning | 0.142 | 0.094 | 0.255 | 0.257 | 0.252 |
| Municipal Court | 0.078 | 0.121 | 0.610 | 0.162 | 0.028 |
| Other | 0.153 | 0.144 | 0.532 | 0.140 | 0.032 |
| Parks and Recreation | 0.028 | 0.075 | 0.416 | 0.339 | 0.143 |
| Public Safety Support | 0.225 | 0.084 | 0.267 | 0.212 | 0.212 |

**Table 15: Support for increasing property tax by time segment**

| Income Group | 2020 | 2020 seg 1 | 2020 seg 2 | 2020 seg 3 | 2021 |
|---|---|---|---|---|---|
| No | 0.354 | 0.528 | 0.336 | 0.434 | 0.654 |
| Yes | 0.501 | 0.410 | 0.515 | 0.432 | 0.278 |
| No Opinion | 0.145 | 0.062 | 0.149 | 0.134 | 0.068 |

**Table 16: Support for any Increase of Fees by time segment**

| Revenue Category | 2020 seg 1 | 2020 seg 2 | 2020 seg 3 |
|---|---|---|---|
| Animal Service Fees | 0.553 | 0.452 | 0.483 |
| Aquatic Fees | 0.499 | 0.342 | 0.385 |
| EMS Transport Fees | 0.213 | 0.114 | 0.135 |
| Fire Permit & Inspection Fees | 0.728 | 0.549 | 0.604 |
| Golf Fees | 0.792 | 0.712 | 0.730 |
| Public Health Permit Fees | 0.573 | 0.366 | 0.427 |
| Parks and Recreation Program Fees | 0.533 | 0.317 | 0.361 |
| Facility Rental Fees | 0.674 | 0.404 | 0.478 |
| Planning and Zoning Fees | 0.631 | 0.458 | 0.499 |

**Table 17: Support for any Increase of Budget by time segment**

| Department | 2020 seg 1 | 2020 seg 2 | 2020 seg 3 |
|---|---|---|---|
| Animal Services | 0.197 | 0.557 | 0.493 |
| Austin Fire Department | 0.260 | 0.446 | 0.404 |
| Austin Police Department | 0.229 | 0.027 | 0.059 |
| Austin Public Health | 0.537 | 0.899 | 0.850 |
| Austin Public Library | 0.284 | 0.702 | 0.605 |
| Emergency Medical Services | 0.399 | 0.743 | 0.674 |
| Municipal Court | 0.097 | 0.370 | 0.332 |
| NHCD | 0.392 | 0.828 | 0.792 |
| Other | 0.120 | 0.337 | 0.327 |
| Parks and Recreation | 0.366 | 0.661 | 0.613 |
| Planning and Zoning | 0.104 | 0.301 | 0.281 |

**Table 18: Support for any Decrease of Budget**

| Department | 2020 seg 1 | 2020 seg 2 | 2020 seg 3 |
|---|---|---|---|
| Animal Services | 0.227 | 0.061 | 0.083 |
| Austin Fire Department | 0.136 | 0.087 | 0.093 |
| Austin Police Department | 0.427 | 0.934 | 0.872 |
| Austin Public Health | 0.085 | 0.013 | 0.024 |
| Austin Public Library | 0.216 | 0.040 | 0.070 |
| Emergency Medical Services | 0.054 | 0.017 | 0.022 |
| Municipal Court | 0.263 | 0.123 | 0.129 |
| NHCD | 0.214 | 0.032 | 0.058 |
| Other | 0.370 | 0.106 | 0.125 |
| Parks and Recreation | 0.146 | 0.040 | 0.055 |
| Planning and Zoning | 0.326 | 0.139 | 0.143 |

## D.1  Age Adjusted results for 2020 over time

**Table 19: Support for Increase of Fees, Age Adjusted (2020 seg 1), n=642**

|  | No change | Moderate increase | Significant increase |
|---|---|---|---|
| Animal Services Fees | 0.416 | 0.456 | 0.128 |
| Aquatic Fees | 0.501 | 0.377 | 0.123 |
| EMS Transport Fees | 0.793 | 0.147 | 0.060 |
| Facility Rental Fees | 0.352 | 0.487 | 0.160 |
| Fire Permit & Inspection Fees | 0.265 | 0.440 | 0.295 |
| Golf fees | 0.202 | 0.315 | 0.483 |
| Parks and Recreation Program Fees | 0.467 | 0.422 | 0.111 |
| Planning and Zoning Fees | 0.317 | 0.337 | 0.345 |
| Public Health Permit Fees | 0.426 | 0.461 | 0.113 |

**Table 20: Support for Increase of Fees, Age Adjusted (2020 seg 2), n=29,544**

|  | No change | Moderate increase | Significant increase |
|---|---|---|---|
| Animal Services Fees | 0.521 | 0.405 | 0.075 |
| Aquatic Fees | 0.637 | 0.302 | 0.061 |
| EMS Transport Fees | 0.857 | 0.099 | 0.044 |
| Facility Rental Fees | 0.528 | 0.386 | 0.087 |
| Fire Permit & Inspection Fees | 0.379 | 0.430 | 0.191 |
| Golf fees | 0.246 | 0.269 | 0.484 |
| Parks and Recreation Program Fees | 0.637 | 0.310 | 0.053 |
| Planning and Zoning Fees | 0.457 | 0.351 | 0.192 |
| Public Health Permit Fees | 0.580 | 0.357 | 0.063 |

**Table 21: Support for Increase of Fees, Age Adjusted (2020 seg 3), n=4964**

|  | No change | Moderate increase | Significant increase |
|---|---|---|---|
| Animal Services Fees | 0.496 | 0.419 | 0.085 |
| Aquatic Fees | 0.592 | 0.341 | 0.066 |
| EMS Transport Fees | 0.846 | 0.116 | 0.038 |
| Facility Rental Fees | 0.465 | 0.440 | 0.095 |
| Fire Permit & Inspection Fees | 0.337 | 0.466 | 0.197 |
| Golf fees | 0.225 | 0.318 | 0.457 |
| Parks and Recreation Program Fees | 0.604 | 0.332 | 0.064 |
| Planning and Zoning Fees | 0.430 | 0.381 | 0.190 |
| Public Health Permit Fees | 0.527 | 0.400 | 0.073 |

**Table 22: Support for Change of Budget, Age Adjusted (2020 seg 1), n=642**

|  | Significant reduction | Moderate reduction | No change | Mod. increase | Sign. increase |
|---|---|---|---|---|---|
| Animal Services | 0.064 | 0.131 | 0.557 | 0.135 | 0.112 |
| Austin Fire Department | 0.007 | 0.160 | 0.575 | 0.257 | 0.001 |
| Austin Police Department | 0.132 | 0.359 | 0.332 | 0.175 | 0.001 |
| Austin Public Health | 0.010 | 0.046 | 0.328 | 0.464 | 0.152 |
| Austin Public Library | 0.031 | 0.143 | 0.453 | 0.291 | 0.082 |
| Emergency Medical Services | 0.001 | 0.051 | 0.483 | 0.412 | 0.053 |
| Municipal Court | 0.038 | 0.227 | 0.624 | 0.071 | 0.039 |
| NHCD | 0.089 | 0.081 | 0.383 | 0.135 | 0.313 |
| Other | 0.057 | 0.305 | 0.488 | 0.125 | 0.025 |
| Parks and Recreation | 0.011 | 0.144 | 0.447 | 0.349 | 0.049 |
| Planning and Zoning | 0.126 | 0.169 | 0.563 | 0.043 | 0.099 |

**Table 23: Support for Change of Budget, Age Adjusted (2020 seg 2), n=29545**

|  | Significant reduction | Moderate reduction | No change | Mod. increase | Sign. increase |
|---|---|---|---|---|---|
| Animal Services | 0.042 | 0.046 | 0.405 | 0.140 | 0.368 |
| Austin Fire Department | 0.015 | 0.072 | 0.479 | 0.425 | 0.010 |
| Austin Police Department | 0.536 | 0.336 | 0.071 | 0.056 | 0.001 |
| Austin Public Health | 0.005 | 0.021 | 0.126 | 0.324 | 0.524 |
| Austin Public Library | 0.015 | 0.052 | 0.291 | 0.339 | 0.304 |
| Emergency Medical Services | 0.003 | 0.017 | 0.292 | 0.454 | 0.233 |
| Municipal Court | 0.059 | 0.079 | 0.530 | 0.160 | 0.172 |
| NHCD | 0.030 | 0.022 | 0.172 | 0.086 | 0.689 |
| Other | 0.043 | 0.101 | 0.550 | 0.209 | 0.097 |
| Parks and Recreation | 0.009 | 0.043 | 0.325 | 0.482 | 0.142 |
| Planning and Zoning | 0.087 | 0.087 | 0.559 | 0.075 | 0.191 |

**Table 24: Support for Change of Budget, Age Adjusted (2020 seg 3), n=4965**

|  | Significant reduction | Moderate reduction | No change | Mod. increase | Sign. increase |
|---|---|---|---|---|---|
| Animal Services | 0.044 | 0.042 | 0.436 | 0.130 | 0.347 |
| Austin Fire Department | 0.021 | 0.076 | 0.505 | 0.389 | 0.010 |
| Austin Police Department | 0.557 | 0.286 | 0.085 | 0.071 | 0.001 |
| Austin Public Health | 0.005 | 0.020 | 0.146 | 0.291 | 0.537 |
| Austin Public Library | 0.021 | 0.062 | 0.341 | 0.325 | 0.252 |
| Emergency Medical Services | 0.008 | 0.018 | 0.317 | 0.422 | 0.234 |
| Municipal Court | 0.058 | 0.075 | 0.545 | 0.151 | 0.172 |
| NHCD | 0.034 | 0.034 | 0.168 | 0.072 | 0.691 |
| Other | 0.044 | 0.102 | 0.547 | 0.197 | 0.110 |
| Parks and Recreation | 0.016 | 0.050 | 0.354 | 0.444 | 0.136 |
| Planning and Zoning | 0.078 | 0.087 | 0.565 | 0.069 | 0.201 |

# E FOLLOW-UP SURVEY 2021

Three scenarios were designed based on aggregated clusters from the available 2021 responses. Figures 9 and 10 display them the way they were presented to the survey takers.

(1) Scenario rev-A is no change in property tax, and no change in service fees, except for a moderate increase in animal service fees

(2) Scenario rev-B is no change in property tax, and a moderate increase in all service fees, except no increase for animal service fees and a significant increase for golf fees.

(3) Scenario rev-C is an increase in property tax, and a moderate increase in all service fees except no increase in aquatic fees and park and recreation program fees.

(4) Scenario exp-A is a significant decrease for the police department, and a moderate increase in all other departments, except no change to animal services and 'other'.

(5) Scenario exp-B is a moderate increase for the police department, and Public Health, but no change to other departments.

(6) Scenario exp-C is a moderate increase for the police department, and a moderate decrease for all other departments except for Emergency Medical Services and Parks and Recreation.

| Source | Scenario A | Scenario B | Scenario C |
|---|---|---|---|
| Property Tax | No Support for Increase | No Support for Increase | Support for Increase |
| Fees: | | | |
| Animal Service Fees | Moderate Increase | No Change | Moderate Increase |
| Aquatic Fees | No Change | Moderate Increase | No Change |
| Facility Rental Fees | No Change | Moderate Increase | Moderate Increase |
| Fire Permit & Inspection Fees | No Change | Moderate Increase | Moderate Increase |
| Golf Fees | No Change | Significant Increase | Moderate Increase |
| Parks and Recreation Program Fees | No Change | Moderate Increase | No Change |
| Planning and Zoning Fees | No Change | Moderate Increase | Moderate Increase |
| Public Health Permit Fees | No Change | Moderate Increase | Moderate Increase |

**Figure 9: The 3 revenue scenarios as presented to participants in the 2021 follow-up survey. The order of the scenarios was randomized.**

| | Current percentage | Scenario A | Scenario B | Scenario C |
|---|---|---|---|---|
| Animal Services | 1.5 % | No Change | No Change | Moderate Decrease |
| Austin Police Department | 26.9 % | Significant Decrease | Moderate Increase | Moderate Increase |
| Austin Public Health | 9.4 % | Moderate Increase | Moderate Increase | Moderate Decrease |
| Austin Public Library | 5.4 % | Moderate Increase | No Change | Moderate Decrease |
| Emergency Medical Services | 9.3 % | Moderate Increase | No Change | No Change |
| Housing and Planning | 1.6 % | Moderate Increase | No Change | Moderate Decrease |
| Parks and Recreation | 9.3 % | Moderate Increase | No Change | No Change |
| Public Safety Support | 11.1 % | Moderate Increase | No Change | Moderate Decrease |
| Other | 2.8 % | No Change | No Change | Moderate Decrease |
| TOTAL | | | | |

**Figure 10: The 3 expenditure scenarios as presented to participants in the 2021 follow-up survey. The order of the scenarios was randomized.**

# F CLUSTERING



**Figure 11: Support for increase in property tax, by cluster (2020)**



**Figure 12: Support for increase in property tax, by cluster (2021)**
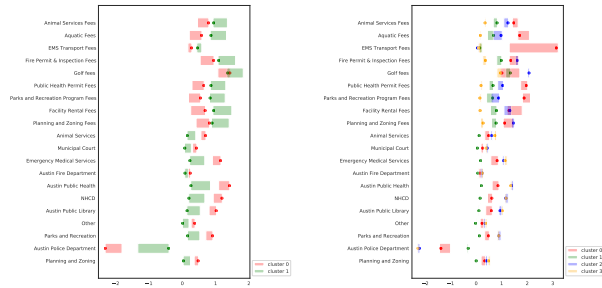


**Figure 13: 2020 centroid budget shift per service area, for 2 clusters with 0.95 confidence interval**



**Figure 14: 2020 centroid budget shift per service area, for 4 clusters with 0.95 confidence interval**
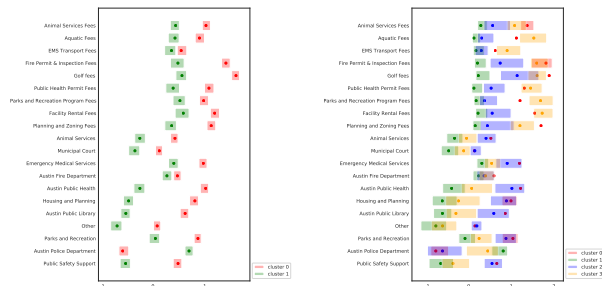


**Figure 15: 2021 centroid budget shift per service area, for 2 clusters with 0.95 confidence interval**



**Figure 16: 2021 centroid budget shift per service area, for 4 clusters with 0.95 confidence interval**

**Table 25: Ranked preference per revenue (n=127) and expenditure scenario (n=135)**

| Rank | rev-A | rev-B | rev-C | exp-A | exp-B | exp-C |
|------|-------|-------|-------|-------|-------|-------|
| 1 | 36 | 60 | 31 | 80 | 37 | 18 |
| 2 | 40 | 52 | 35 | 14 | 87 | 34 |
| 3 | 51 | 15 | 61 | 41 | 11 | 83 |