# Does Diversity Improve Group Performance? Evidence from U.S. City Councils

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## Abstract

Using a regression discontinuity design that exploits close elections between different-race candidates, I estimate the causal effect of increasing racial diversity on city council performance, measured by future vote shares. Consistent with theories on diversity in groups of varying sizes, I find that diversity improves performance in large councils, increasing next election vote shares by 5.9%. However, increased diversity has no effect or decreases performance in small councils. I investigate key communication mechanisms through natural language processing on city council meeting transcripts. I find that increased racial diversity causes large shifts in discussion topics, moving discussion toward commentary from the public and city officials and zoning legislation. However, diversity also increases negative sentiment overall within these meetings by 35% from baseline. Heterogeneity by council size suggests differences in these crucial communication mechanisms may drive the differences in performance gains. These results highlight the role of communication in mediating diversity's effects, showing that diversity enhances performance when groups are large enough to mitigate frictions.

## 1. Introduction

The push for greater diversity in organizations has intensified in recent years, driven in large part by claims of its practical benefits for group performance. Proponents argue that diversity enhances decision-making, innovation, and financial performance, with top consulting firms like McKinsey & Company, Bain & Company, and Boston Consulting Group suggesting Diversity, Equity, and Inclusion (DEI) initiatives are key to boosting revenue and employee retention. The DEI market itself is projected to reach a $30 billion valuation by 2033.[1] However, skepticism is growing. The Economist notes a surge in diversity-focused hiring since 2010, yet recent corporate and governmental backpedaling—such as the U.S. government's decision to layoff DEI personnel and dissolve many DEI programs in early 2025—suggest increasing doubts about the effectiveness of these initiatives. Despite the significant attention dedicated to diversity, we know very little about the effects of diversity on group performance, how these effects vary based on group attributes, and the channels through which these effects operate.

Theories from economics and social psychology suggest that diversity can either enhance or hinder group performance through its effects on communication, with the impacts potentially varying by group size. These theories highlight two primary mechanisms through which diversity influences performance: an increased opportunity for information exchange, which can enhance performance (Hong and Page 2004), and a higher likelihood of communication frictions, which can hinder performance (Becker 1957; Lazear 2001; Prat 2002; Lyons 2017). Group size also plays a key theoretical and qualitative role, with several studies finding that smaller groups may suffer from particularly strong frictions (Wegge et. al 2008; Boehm et. al 2014; Robert and Romero 2017; Park 2019).

[1] According to a 2023 report by Global Market Insights, Inc.

Despite the policy interest and theoretical motivation, empirical research on diversity's effects is limited, often focusing on specialized, smaller-scale settings.[2] These studies contain little variation in group size and are unable to examine the role of communication as a mediating factor. These exclusions are notable given the varying capacity for communication across these settings, and the theoretical tension between the potential positive and negative effects of diversity and its relationship to group size.

I provide new evidence on the effect of racial diversity on group performance in a meaningful, nationwide setting: U.S. city councils. The local government setting offers key advantages for studying diversity and communication: city councils make impactful decisions affecting thousands of constituents, are common worldwide, and provide extensive opportunities for group interaction. Additionally, the varying sizes of city councils nationwide allow me to analyze how diversity's effects scale with group size. Finally, publicly available council meeting records allow me to open the black box and examine how diversity affects performance through changes in communication that other studies have been unable to quantify.

To estimate the effects of racial diversity, I leverage the quasi-random variation in winners of close elections and a new dataset on local government elections. I examine the universe of U.S. city council elections in medium and large cities between 1989 and 2021 using the American Local Government Elections Database (Benedictis-Kessner et. al 2023). This database grants access to candidate demographic characteristics and variation from over 40,000 local elections. Using these data, I employ a vote share regression discontinuity design, exploiting the quasi-random variation in election victories between different-race candidates who

[2] Prominent examples include Dutch exchange student classrooms, production lines at a plant in Kenya, door-to-door canvassing pairs at an NGO in Kenya, and Indian cricket teams (Hoogendorn et al 2013, Hjort 2014, Marx et al 2015, Lowe 2021).

barely win or barely lose elections to the city council. The outcome of these contests is a plausibly exogenous shock to council diversity. I estimate the effect of this exogenous change in diversity on council performance.

As a primary outcome for evaluating council performance, I examine the vote shares councils receive in their next election after a close contest between candidates who differ by race. Vote share encapsulates how cities respond to council behavior, reflecting public sentiment toward the council's effectiveness, and has been shown to be a reliable performance metric for elected offices (Becher and Donnelly 2013; Stiers 2021). Further, vote shares offer a consistent measure of how well the council meets evolving local goals. I also examine whether councilors seek reelection and whether they face contested reelections, capturing additional dimensions of public approval and councilor attrition.

I find no average effect of racial diversity on council performance. This obscures meaningful heterogeneity in effects by council size that are consistent with theoretical predictions on the role of information exchange and communication frictions. Councils above sample median size – more than 7 seats – experience a 5.8 percentage point increase in vote shares in the next election when the nonmodal race candidate wins. Smaller councils see a decrease or no change in next election vote shares, consistent with theoretical predictions about performance-inhibiting communication friction in smaller groups.

Understanding the role of communication is central to understanding diversity's effects on group performance. While diverse groups may benefit from broader perspectives and enhanced information exchange, they may also face higher communication costs. I examine how racial diversity influences city council performance by affecting two key communication mechanisms: information exchange and communication friction. To do so, I analyze city council

meeting transcripts using natural language processing (NLP) methods, constructing a dataset of over 18 million transcribed sentences.

First, I test whether racial diversity affects information exchange by applying topic modeling techniques to identify latent themes in city council discussions. Theoretical and experimental research suggests that diversity facilitates the exchange of new ideas and different perspectives, which should be reflected in shifts in discussion topics. Consistent with this hypothesis, I find that electing a nonmodal councilor reallocates discussion time toward public and city official input and increases deliberation on zoning legislation.

Second, I examine whether diversity increases communication friction, which could offset the benefits of enhanced information exchange. Using a combination of three leading sentiment classification models, I quantify how increased racial diversity affects disagreement and conflict in council meetings. The results indicate that electing a nonmodal race councilor increases the share of spoken sentences classified as negative by 0.84%, a 35% increase from baseline levels.

Finally, I use heterogeneity analysis to show that these shifts in communication patterns likely drive changes in council performance. As predicted by literature on diversity and group size, the effects of diversity on topic shifts and sentiment depend on council size. Large councils experience greater shifts in discussion topics, no increases in negativity, and see performance gains, as measured by next-election vote shares. In contrast, small councils exhibit minimal shifts in discussion topics, enormous increases in negativity, and see no performance improvements. These results align with theoretical predictions that the benefits of diversity are more pronounced in larger groups, where the gains from broader information exchange outweigh the costs of increased communication friction.

This paper contributes to the literature on diversity and group performance by providing direct evidence on the communication mechanisms underlying these effects, and identifying the role of group size in performance and communication effects for diverse groups. By leveraging NLP techniques to measure speech dynamics in city councils, I offer new insights into how diversity reshapes group decision-making and collective performance.

## 2. Background

### 2.1 Communication Tension in Diverse Groups

Diversity has the potential to enhance group performance by introducing new perspectives and problem-solving approaches. The widely cited "Diversity Trumps Ability" model (Hong and Page 2004) formalizes this idea, demonstrating that cognitively diverse groups outperform homogenous but individually more capable groups. Since racial diversity is often correlated with cognitive diversity (Page 2007), it may improve performance through this mechanism. Other papers in psychology have supported the idea that racially diverse groups can improve performance by introducing new ideas or perspectives, contributing to innovation (Bantel and Jackson 1989; MacLeod et. al 1996; De Dreu and West 2001). However, the effectiveness of this channel depends on the availability of successful communication between group members. Without the opportunity for effective communication, the benefits of diversity may be unrealized.

Other theoretical models suggest that diversity may hinder performance by increasing communication barriers. Modern economic models of workplace diversity predict that differences in language, norms, and trust can create inefficiencies (Becker 1957; Lazear 2001;

Prat 2002; Lyons 2017; Hankins et al. 2023). These frictions can slow or even stifle decision-making and reduce overall effectiveness, particularly in groups where coordination is essential.

The net effect of diversity on group performance depends on whether the benefits of cognitive diversity outweigh the potential costs of communication frictions. Empirical work has largely focused on settings where quantifying communication at all, much less disentangling new perspectives from communication friction, is impossible. This paper directly examines these mechanisms by leveraging city council meeting transcripts to quantify communication changes in response to diversity.

### 2.2 The Role of Group Size

The relationship between diversity and performance likely depends on group size. A common intuition is that diversity should have less impact in larger groups, where individual members contribute less to overall decision-making. However, theoretical and experimental evidence suggests the opposite—diversity tends to have stronger effects in larger groups, where varied perspectives have more opportunities to shape discussions and decisions (Wegge et al. 2008; Boehm et al. 2014; Robert and Romero 2015; Park 2019; Pereira et al. 2024). These findings suggest that studies focusing exclusively on small councils may misrepresent the broader effects of diversity on governance. By analyzing city councils of varying sizes nationwide, this paper provides new insight into how group size moderates diversity's impact.

### 2.3 Empirical Evidence

A substantial empirical literature explores the effects of gender diversity on group decision-making, but relatively little work has examined racial diversity in real-world groups.

Additionally, existing studies often acknowledge the role of communication in diversity's impact, but do not incorporate direct measures of group communication into their designs. Furthermore, these studies are often limited to examining groups of very similar or usually identical size. Studies on Dutch exchange student classrooms, production lines in a Kenyan factory, and door-to-door canvassing teams in Kenya find mixed effects of diversity on performance (Hoogendoorn et al. 2013; Hjort 2014; Marx et al. 2015). There are a handful of papers leveraging close victories in city council elections to address a variety of questions, with Beach and Jones (2017) providing one of the few estimates of racial diversity's impact on governance. However, these papers also do not directly investigate the role of communication in shaping outcomes or the role of group size.

This paper contributes to empirical literature by directly addressing the role communication plays in the effect of racial diversity on group performance. Using a large dataset covering councils of varying sizes and demographic compositions, I provide new evidence on how diversity influences group deliberation, policy outcomes, and public response.

### 2.4 U.S. City Councils

City councils provide an ideal setting for studying the effects of diversity on group performance for a variety of reasons.

First, city council decisions have significant consequences on their areas of governance, affecting public goods provision, budgeting, and local policy implementation for large populations. City councils play an important legislative role in shaping local policy. Beyond constructing city budgets overall, they define the roles and functions of other municipal officers, impose taxes, enter into contracts, provide public goods in the form of utilities, education, and

public recreation, and issue licenses for local business, among many other functions that vary by city and state (MSRC Washington). Understanding how diversity influences these decisions has broad implications for public welfare.

Second, council-based governance is a common institutional structure both in the United States and globally, making findings from this setting widely applicable. Within the U.S. alone, there are 35,705 township and municipal governments (Federal Reserve at St Louis). These governments primarily use one of two common structures where the city council plays a pivotal role: the council-manager form or the mayor-council form. In 2008, over 90% of U.S. cities used one of these forms of government. (ICMA). Examining diversity's effects in this context provides insights relevant to a broad range of policymaking bodies.

Third, city council elections provide a natural source of exogenous variation in group diversity. A fundamental problem for studying the causal effect of diversity in groups is selection bias. Real-world teams, classrooms, and legislative bodies are almost never formed randomly; it's likely some types of groups may be more likely to become racially diverse, and that these group characteristics may also affect performance. Close elections in which candidates from different racial backgrounds win by narrow margins create as-good-as-random variation in council composition, with other candidate and council characteristics being orthogonal to the race of the winning candidate. This quasi-experimental variation allows for credible causal estimation of diversity's effects.

Fourth, city councils vary in size, allowing for an analysis of how diversity's effects scale with council size. This is crucial since theoretical and lab research in psychology and economics shows that diversity's effects vary by group size. Previous papers studying city council outcomes often focus exclusively on California councils, which are almost always smaller than the national

median. A California-only analysis lacks the variation needed to assess differing effects by group size. The national dataset used in this paper allows me to isolate the role of group size, revealing that small councils respond to diversity differently than larger councils. Extrapolating from a California sample without considering group size would misrepresent diversity's true impact on group performance.

Fifth, city councils operate through structured deliberative processes, providing ample opportunities for interaction among members. Council meetings serve as a formal venue for debate, negotiation, and policymaking. Given that theoretical models emphasize communication as a key mechanism for diversity's effects, the city council setting offers a unique opportunity to test these predictions empirically. Understanding how diversity alters communication dynamics in these meetings sheds light on the broader question of how group composition affects decision-making.

Finally, city council meeting records are publicly available and well-documented, enabling detailed analysis of group interactions. Previous studies have been unable to directly quantify communication between group members. By utilizing meeting transcripts, this paper provides direct evidence on how diversity shapes communication in ways that impact performance, allowing for a deeper understanding of the mechanisms at play.

While city councils provide an excellent setting for studying diversity's effects, this approach has some limitations. First, the findings may not generalize perfectly beyond deliberative policymaking bodies. The degree to which other groups –such as private-sector business or sports teams – differ from city councils in ways important for diversity's effects may limit external validity. Second, this paper addresses only relatively short-term effects of diversity within the length of an election term. Effects due to diversity may persist across election years,

particularly if diverse councils implement different long-lasting city policies. Third, meeting transcripts, while offering valuable natural language for capturing effects on communication during council meetings, do not capture informal interactions among council members, which may also influence decision-making. Despite these limitations, this paper offers novel insights into how diversity affects group performance through communication and decision-making processes.

## 3. Empirical Approach

### 3.1. Election Data

I leverage variation in city council elections at the national level by using a new dataset published in late 2023, called the American Local Government Elections Database (Benedictis-Kessner et. al 2023). This is a database of about 78,000 candidates in 57,000 electoral contests across multiple types of city offices in medium and large cities in the U.S. between 1989-2021. In addition to electoral outcomes, this dataset provides some partisan and demographic information about candidates, including race and gender, allowing me to estimate the impact of a winning candidate's race on city council outcomes.

Using this information on historical elections, I construct data for standing city councils for every year between 1989-2021 in available cities to calculate council-level racial composition. Given the outcome of each election, each seat on the council is filled by a winning candidate year after year until the entire council is filled. I then calculate the share of each represented race and the modal race for filled councils (Black, White, Hispanic, Asian, Other), and use the elections in subsequent years to identify the impact of increasing diversity.

Table 1 presents summary statistics for the sample of cities, councils, and candidates for election to city councils. The first column includes the statistics for the full sample, while the second column includes statistics for my estimation subsample of cities, councils, and candidates. These data include nearly 400 large cities, with average population over 200,000. These cities are predominantly, White, with Black, Hispanic, and Asian residents comprising the minority on average. The sample covers about 4,000 distinct councils over time, with an average size of between 7 and 8 seats. In 88% of these councils, the modal race is White. At the candidate level, the data include over 19,000 candidates, with 80% of the modal candidates being White. Roughly 1,800 of these candidates are nonmodal race candidates.

### 3.2. Measuring Diversity

I measure changes in city council racial diversity based on the council's modal race—the most common racial identity among sitting council members, determined by the council's composition immediately before an election. To isolate the effects of diversity shifts, I focus on elections where a candidate matching the modal race competes against a candidate who does not match the modal race. If the nonmodal candidate wins, the racial diversity of the council increases. I will refer to these elections as nonmodal elections. The outcomes of these contests directly impact council diversity, providing a clear framework for assessing diversity's effects on council performance.

In rare cases, this approach could misidentify an increase in diversity if the election itself causes a shift in the council's modal race. However, Figure 1 shows that the modal race remains largely stable over time. Furthermore, only 5.3% of nonmodal elections in my final sample result in a change to the modal race, making any potential misidentification too rare to meaningfully

impact my estimates. Later in this section, I present first stage results in Table 2 using additional measures of diversity, confirming that, regardless of how diversity is defined, electing a nonmodal race candidate increases racial diversity on average. These alternative measures also enhance comparability with previous studies that use different definitions of diversity.

### 3.3. Defining Large and Small Councils

While I estimate effects for my sample overall, how the effect of diversity differs for different-sized groups is also of interest. Conventional intuition would predict larger effects for smaller groups, but theoretical, lab, and qualitative evidence suggest larger groups enjoy larger performance gains. To provide insight into this discrepancy between theory and intuition, I divide my sample into small and large councils on the basis of sample median council size. I classify councils with fewer than 7 seats as small councils, and councils with at least 7 seats as large councils. I estimate effects overall and for each of these samples.

### 3.4. Vote Share Regression Discontinuity Design

My primary empirical strategy is a regression discontinuity design with vote share as the running variable. In support of this design, I leverage the idea that competing candidates very close in vote shares are quasi-randomly assigned to victory.

I restrict my estimation sample to elections where there are at least two candidates that differ by modal-race status. In cases where there are more than two candidates in an election with one winner, I only compare the top two candidates. In elections that have multiple winners, I keep only the last winner and the first loser. These restrictions permit me to isolate the effect of increased diversity while using each election only once as a source of variation.

Since in elections with more than two candidates, a candidate may win with less than 50% of the total vote share, I create a recentered running variable by calculating the difference between the nonmodal race candidate vote share and the modal race candidate vote share. This creates a common cutoff at zero across all election types, with values ranging between -1 (where the nonmodal candidate received no votes) to 1 (where the nonmodal candidate received all the votes). My main specification is as follows:

$$Y_{it} = \beta_0 + \beta_1 1[z_i > 0] + \beta_2 z_i + \beta_3 1[z_i > 0] * z_i + \epsilon_{it}$$

where $Y_{it}$ is the vote share of a different councilor on the same council as candidate $i$ in election cycle $t$, and $z_i$ is the difference between nonmodal candidate $i$'s vote share and their opponent's vote share. $1[z_i > 0]$ is an indicator for nonmodal candidate victory; if $z_i$ is positive, this means the nonmodal candidate received a greater vote share than their opponent, winning that seat on the city council and increasing the diversity of that council. The coefficient on $1[z_i > 0]$, $\beta_1$, is the coefficient of interest, capturing the effect of a nonmodal race victory on council performance.

Since $Y_{it}$ is measured for each other councilor on the council, larger councils will receive greater weight in this regression design, skewing estimates toward effects on larger councils. I therefore include weights for council size, weighting each observation by the inverse of the number of council seats in that city. This way, I treat variation from each election equally.

This design hinges on a critical assumption: outcomes for nonmodal candidates would be smooth across the cutoff in the absence of victory. While this assumption about a counterfactual is inherently untestable, it does generate testable implications.

### 3.5. Assessing the Validity of the RD Design

A threat to the critical smoothness assumption of regression discontinuity designs is the possibility for manipulation of the running variable. If some candidates (or interested parties) can manipulate their vote shares in close elections and others cannot, this design would be invalid for estimating a causal effect. I test for the possibility of manipulation in two standard ways: density tests and checking for continuity in other variables that may predict manipulation.

I follow the standard approach laid out by McCrary (2008) for testing for shifts in density across the victory cutoff. Since winning is favorable for all candidates, if I observe a statistical difference in observation density at the cutoff, it may indicate manipulation. In Figure A.1, I perform a McCrary test for my overall estimation sample, as well as for subsamples with below- and above-median council size. I find no statistically significant shifts in density.

I also use my main specification with alternative pre-election outcomes to see if a nonmodal candidate victory predicts discontinuities in other relevant variables. In Table A.1, I test for discontinuities in candidate gender, candidate party affiliation, and election turnout. Turnout is a particularly important covariate to examine for potential discontinuity, as Vogl (2014) finds discontinuities in turnout as the likely driver behind a disparity in the race of Black victories in mayoral contests. I attach additional information from the US Current Population Survey to also test for discontinuities in city characteristics such as race shares, income, and labor force participation. I find no statistically significant discontinuities in any of these variables for the overall sample or for council size subsamples, suggesting that systematic manipulation of the vote-share-based running variable is unlikely.

### 3.6. First Stage

My regression discontinuity design can only capture the effect of diversity on performance if council racial diversity does actually increase when a nonmodal candidate is elected. In Table 2 I employ my main specification to estimate the effect of electing a nonmodal race councilor on various diversity measures. I observe sizable and statistically significant increases in diversity in every measure.

## 4. Performance

### 4.1. Measuring Council Performance

I measure council performance using the vote shares of all other councilors in the election following a nonmodal election – not including the winner of the nonmodal election. Vote shares reflect public sentiment toward the council's performance, capturing the opinions of those most invested in the council's decisions and effectiveness. Political science research supports vote share as a reliable indicator of officeholder performance: Stiers (2021) finds a strong association between incumbent performance evaluations and their vote shares, while Becher and Donnelly (2013) highlight performance-based voting as a key factor in election outcomes.

While alternative metrics, such as legislative productivity or public service expenditures, might capture certain aspects of council performance, they offer a less comprehensive view than vote shares. Increases in these measures do not necessarily indicate better performance, nor do decreases imply worse performance. Moreover, such metrics can be difficult to compare across different cities and time periods, as municipal priorities vary—some cities emphasize population growth, while others focus on reducing sprawl, attracting businesses, or boosting tourism. These priorities can shift even within the same city over time. In contrast, vote shares provide a

consistent measure of council performance, reflecting how well the council meets its evolving goals as judged by the local electorate.

To further examine how council behavior responds to changes in racial diversity, I also consider whether a councilor's next election is contested and whether they seek reelection. These measures capture additional dimensions of public approval and councilor attrition in response to increased diversity.

### 4.2. Effects of Racial Diversity on Performance

Table 3A presents the overall effects of an increase in racial diversity on city council performance. A nonmodal candidate's victory appears to have no discernible effect on overall council vote shares, ruling out changes greater than an increase of 1.3% or a decrease of 1.4%. This null effect at the aggregate level underscores the importance of disaggregating by council size, as theories predict that the benefits of diversity are more pronounced in larger groups.

Figure 3 confirms this prediction: restricting estimates to larger and larger councils reveals a consistently positive effect of racial diversity on performance when there is sufficient sample size. Table 3B shows that in large councils, the election of a nonmodal candidate leads to a 5.86 percentage point average increase in future vote shares for all other councilors who seek reelection. The effect is strongest for councilors who share the nonmodal councilor's race, increasing their future vote shares by 8.4 percentage points. Notably, even councilors who do not share the nonmodal councilor's race experience an increase in vote shares, though they are 8.8% less likely to seek reelection. This pattern suggests that some of the observed effects may be driven by low-performing incumbents choosing to leave rather than continue participating in a more diverse council.

By contrast, the effects in small councils (Table 3C) exhibit opposite signs from those in large councils and are statistically distinguishable from the large council estimates, suggesting that the dynamics of racial diversity operate differently in smaller deliberative bodies. However, these effects lack statistical significance.

The effects, both for overall estimates and for both large and small councils, are robust to varying bandwidth size: up two twice and half the mean squared error optimal bandwidth as prescribed by Calonico, Cattaneo and Titiunik (2014). I also find these estimates are robust to bandwidths used in other papers examining local elections using a regression discontinuity design (Vogl 2014, Beach and Jones 2017).

To further justify the smoothness assumption, I perform a battery of placebo tests. In Figure A.2, I test whether the election of a nonmodal candidate predicts increases in vote shares for other councilors up to 10 years before the nonmodal election. I find no significant effects on vote shares in any elections prior to the nonmodal election, ruling out the possibility that nonmodal candidates win (lose) more often in places with high (low) council performance.

To address the concern of possible selection in deciding to run for reelection after a nonmodal election, I impute latent vote shares for leavers to estimate a lower bound on the effect of nonmodal victory for large councils. I impute vote shares using three methods. First, I assume leavers would have received a vote share equal to the average of their vote share in previous elections. Reestimating the effect with this assumption yields an increase of 3.8 percentage points, significant at 1%. Second, I assume leavers would have received half of their historical average. Reestimating the effect with this assumption yields an increase of 2.9 percentage points, significant at 5%. Finally, I use a Heckman imputation method selecting on councilor race and the share of the council that does not match the modal race; this method yields an increase of 7.7

percentage points in next election vote share, significant at 1%. Regardless of the method, accounting for the possibility of extreme selection still yields a significant, positive effect of racial diversity on council performance for large councils.

This rich heterogeneity in the effects of diversity would be obscured in an analysis that does not account for variation in group size. The findings suggest that communication mechanisms and collective decision-making processes may differ across councils of varying sizes, with diversity enhancing performance in larger groups while having weaker effects in smaller ones. In the next section, I investigate these communication mechanisms to better understand how diversity influences group performance through changes in deliberation.

## 5. Communication

### 5.1. Transcript Data

To provide information on city council communication during meetings, I merge a subset of the election information provided by the American Local Government Elections Database with the LocalView Public Meetings Database. This is the largest existing dataset of local government public meetings, covering 139,616 transcripts of videos of local government meetings publicly uploaded to YouTube. These data span 1,012 places and 2,861 distinct governments across the United States between 2006-2022. This dataset allows me to examine changes in natural language between councilors, city officials, and the public due to changes in racial diversity. Consequently, I only identify treatment effects on communication mechanisms for cities that selected into posting their public meetings on YouTube between 2006-2022.

I extract meetings labelled as “municipal council” meetings and merge them to the election data by state and city name. I use topic relevance and sentiment classifications for each

council meeting within four years after the election of a nonmodal candidate as outcomes in the main specification described in section 3, resulting in an estimation sample of 8,835 candidate-meeting observations.

### 5.2. Measuring Communication

Identifying quantifiable changes in communication is essential to understanding how diversity influences group performance. The existing literature on diversity's effects offers competing predictions: some studies suggest it fosters the exchange of new ideas, perspectives, and solutions, while others argue it increases communication friction. This is particularly important in the city council setting, where the mechanisms at play during council meetings directly shape policy formulation and implementation. Quantifying communication—such as tracking shifts in dialogue, tone, or conflict patterns—is crucial for identifying which of these mechanisms is actually at play and how diversity ultimately influences council effectiveness. However, disentangling these effects is a difficult empirical challenge.

Quantifying communication is difficult in many settings for three primary reasons. First, not all group settings allow for intragroup communication. Other settings in the diversity and group performance literature often suffer from this; if the benefits of diversity rely on group communication, groups that never communicate are unlikely to see those benefits. The city council setting, on the other hand, relies on group deliberation and external communication. Councils meet frequently and for lengthy amounts of time, making it a natural setting for studying group diversity. Second, few settings have data rich enough to make quantifying communication possible. Again, the city council setting is ideal for addressing this issue. Most city council meetings are required by law to be both public and recorded. Many cities post

transcripts or videos of their meetings online, ensuring a rich source of natural language interactions between group members. Finally, human communication is not conventionally numerical, which makes regression analysis less straightforward. Leaps in natural language processing over the last decade have made quantifying human language reliable and suitable for regression analysis. These techniques transform unstructured text into structured data, turning words and documents into numerical vectors.

To improve the performance of the natural language processing techniques, I use standard methods to clean and restructure the transcript data. I remove in-text pauses, punctuation, proper nouns, and blank meetings. I convert all documents into lower case, and finally lemmatize all words in each document. Lemmatization converts words into their basic form, changing participles and conjugations to their root words (i.e. “winning” becomes “win”, “am” becomes “is”, etc.). Finally, I remove words too common in any context to provide meaning, called “stopwords.” I use Python’s Natural Language Toolkit library of stopwords to remove these common, non-meaningful words from the transcript data.

In line with predictions from theory, I use natural language processing techniques on these cleaned city council transcripts to quantify both communication mechanisms suggested by the literature. First, I use topic modeling techniques to detect shifts in council ideas and perspectives. Second, I use a combination of three leading sentiment analysis models to quantify emotional tone behind statements made in meetings and examine changes in negative sentiment when a nonmodal councilor wins a close election.

### 5.2.1. Topic Modeling

I use a standard Latent Dirichlet Allocation (LDA) model to detect latent themes in across city council meetings and calculate the share of each meeting associated with each topic. The LDA model takes all cleaned documents in my sample and treats each document as a mixture of topics. It defines each topic as a mixture of words within the document. For example, a topic detected by LDA may return a topic with this combination of words: "water, pipes, rain, flow, cost, budget." This means those words meaningfully associated with each other across many meetings in many cities. Within the city council context, it is likely councilors in these meetings are discussing public utility provision of some kind. Researchers often assign labels to these "word-group" topics for ease of use and interpretability. In this example, we might assign the label "water provision." While the label is useful for interpretation, it is not empirically necessary and has no implications for internal validity.

LDA begins by randomly assigning words in each document to different topics. It uses a collapsed Gibbs Sampling technique to iteratively change what topic a word is assigned to based on the prevalence of a topic within that document, and how common the word is in that topic across the entire corpus of documents. This process gradually refines the topic assignments until it converges on a set of stable topic distributions. The LDA model takes several hyperparameters as inputs, which I optimize my using a randomized parameter search to maximize log likelihood.

Table 4 reports the topics found by LDA model. I find 20 topics across all city council meetings in my sample. I assign labels to each topic based on the 20 most important words that compose the topic. The topics themselves as well as the shares of each topic presented in Table 5 are largely in line with those found by the NLC evaluations of mayoral speeches, as well as resolution topics found by data entry workers classifying proposals in city council meeting

minutes, as presented in Bruhn, Choon, Weber, and Brito (2024). Note that language and items related to city council procedure and public participation take up a large portion of most city council meetings.

### 5.2.2. Sentiment Analysis

I assess communication friction using a combination of three prominent sentiment analysis models: VADER (Hutto and Gilbert 2014), TextBlob (Loria 2018), and RoBERTa (Loureira et. al 2022). VADER and TextBlob are both lexicon-based models, which assign sentiment scores to individual words and apply context-based rules to determine whether a sentence expresses positive, negative, or neutral sentiment. In contrast, RoBERTa is a more advanced deep-learning model trained on social media data, designed to capture more nuanced sentiment, including sarcasm, irony, and other complex language features.

Sentiment analysis models are often designed to evaluate sentiment in smaller sections of text, i.e. sentences, tweets, or small paragraphs. To improve performance for these models, I divide all meeting transcripts in my sample into collections of sentences using a cutting-edge model produced by Frohman et. al (2024), that doesn't rely on punctuation. This model outperforms all other methods of sentence tokenization including Large Language Models (LLM), especially when text is unusually formatted, as is often the case with speech-to-text transcripts.

For each sentence, I calculate sentiment scores across all models, which can take on values between 0 and 1. To classify a sentence as negative as opposed to positive or neutral, the researcher must specify a cutoff for the sentiment score. In Figure A.3, I show that my ultimate regression discontinuity estimate for nonmodal victory's effect on negative sentiment does not

depend on choice of sentiment score cutoff. For all models, I require the score for negative sentiment to be higher than scores for both positive and negative sentiment, and to be higher than 0.33. I aggregate across sentences within meetings, calculating the percentage of each meeting that is classified as negative, neutral, or positive sentiment. I use this meeting-level sentiment as my primary outcome for evaluating diversity's effects on communication frictions.

### 5.3. Effects of Racial Diversity on Communication

#### 5.3.1. Discussion topics

I implement the same RD design from section 3.4, with candidate-meeting as the unit of observation. For the outcome, I use the topic relevance, i.e. the share of each meeting composed of each topic. The interpretation of $\beta_1$ in this context is the effect of a nonmodal race candidate victory on the share of each subsequent meeting dedicated to the given topic (public commentary, zoning legislation, etc.). I interpret shifts in topic relevance as changes in council ideas and perspectives due to changes in diversity. As some city councils will have more meetings than others, I weight observations by the number of meetings, to give each nonmodal election equal weight.

I find that racial diversity significantly changes council meeting discussions, substituting time toward public and city official commentary, and zoning legislation. I present these results in Table 6. Council meeting discussion dedicated to public commentary increases by 6.8%, an increase of 45% from baseline. Discussion of zoning legislation increases by 6.1%, an increase of 67% from baseline. Commentary from city officials increase by 2.3%, an increase of 38% from baseline.

These shifts in topic relevance represent sizable changes in council discussions due to increased racial diversity. The increase in discussion of zoning legislation is particularly notable, as city zoning regulation is one of the council's most powerful policy tools. Changes in budget discussion paired with changes in discussion of other topics due to racial diversity may be reflected in where the city council decides to spend its limited funds.

### 5.3.2. Communication Friction

Continuing with the same RD design, candidate-meeting observations, and meeting weights, I estimate the impact of a nonmodal race victory on the positive, negative, and neutral sentiment. Table 7 provides examples of how each model classifies the sentiment of various sentences. For each sentence, I use the most common classification between these three models. The interpretation of $\beta_1$ in this context is the effect of a nonmodal race candidate victory on the share of each subsequent meeting that is positive, negative, or neutral. I interpret shifts in these variables, especially in negative sentiment, representing changes in disagreement and verbal conflict in council meetings, in line with qualitative analyses of conflict in school board meetings (Holman, Johnson, and Simko 2024).

I find that racial diversity significantly increases conflict in city council meetings. I present results for sentiment in Table 8. The election of a nonmodal race candidate increases negative sentiment by 0.8 percentage points, which is a 35% increase from baseline. This increase in negativity comes from decreases in both positive and neutral speech, though estimates here are imprecise, implying the increase in negativity is not driven by a decrease in solely positivity or solely neutrality. Estimate signs are robust to choice of classification model.

### 5.3.3. Heterogeneity by Council Size

How do these estimates on discussion topics and negative sentiment relate to council performance? I observe changes in topic discussion and council perspectives that theory predicts would lead to increased performance, but also increases in disagreement and conflict that theory predicts might hinder performance. In light of the null result on performance overall, this is not surprising; these competing effects appear to cancel each other out. However, I also observe differences in the effect of diversity in performance based on council size. Do effects on performance line up with effects on topic discussion and negative sentiment?

I find much stronger shifts in topic discussion for larger councils. Across almost all discussion topics, the significant coefficients for large councils are sizable, while shifts for smaller councils are negligible in comparison, with the exception of public commentary. This is consistent with my findings on performance: larger councils see sizable changes in council discussion, and significant gains in vote shares, while small councils see negligible changes in council discussion, and no gains in vote shares.

Furthermore, I find much greater increases in negative sentiment for smaller councils. In fact, the overall increase in negativity is driven completely by smaller councils, with an increase in negative sentiment of 2 percentage points (nearly 100% from baseline) for these councils. Large councils see no significant effect on negative sentiment, while enjoying large gains in performance. One possible explanation for increased negativity on small councils relative to large councils is that conflict is harder to avoid in a small group. In larger groups, there are many other councilors to interact with, while in smaller groups, each councilor must participate more often with each given councilor.

These heterogeneous effects by council size in performance, topic discussion, and communication friction are consistent with the mechanisms predicted by the literature. Additionally, they highlight the importance of examining a variety of group sizes when evaluating the effects of diversity on performance.

## 6. Conclusion

This paper contributes to the ongoing debate on the effects of diversity on group performance by providing new, causal evidence from the U.S. city council setting. I show that racial diversity can have significant, but heterogeneous, effects on performance depending on council size, as suggested by recent lab experiments and qualitative work. Larger councils benefit from increased diversity, experiencing improved performance in the form of 5.6 percentage point higher vote shares and more substantial shifts in discussion topics. In contrast, smaller councils see little to no performance improvement and face greater communication frictions, reflected in a near 100% increase in negative sentiment in city council meetings. By leveraging natural language processing techniques to quantify changes in discussion topics and sentiment, I provide a detailed understanding of how diversity impacts communication, which in turn affects group performance. These findings highlight the importance of group size when evaluating the effects of diversity, suggesting that while diversity can promote better group performance in some cases, it may also create challenges that need to be managed carefully in others.

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**Table 1. Summary statistics**

| Panel A: Cities | All | Final sample |
|---|---|---|
| Population | 218,036 | 255,980 |
| | (488,338) | (566,801) |
| White | 0.68 | 0.65 |
| Black | 0.16 | 0.18 |
| Hispanic | 0.26 | 0.28 |
| Asian | 0.10 | 0.11 |
| Other | 0.02 | 0.02 |
| Female | 0.51 | 0.51 |
| N | 399 | 298 |

| Panel B: Councils | All | Final sample |
|---|---|---|
| Num seats | 7.67 | 8.85 |
| Num White | 5.28 | 5.75 |
| Num Black | 1.15 | 1.59 |
| Num Hispanic | 0.76 | 0.97 |
| Num Asian | 0.19 | 0.24 |
| Num other | 0.003 | 0.006 |
| Num male | 5.47 | 6.32 |
| Num female | 2.20 | 2.53 |
| Modal White | 0.88 | 0.84 |
| Modal Black | 0.07 | 0.08 |
| Modal Hispanic | 0.08 | 0.08 |
| Modal Asian | 0.02 | 0.02 |
| Fractionalization | 0.32 | 0.38 |
| Polarization | 0.51 | 0.61 |
| N | 4,048 | 1,380 |

| Panel C: Candidates | All candidates | Modal race candidates | Nonmodal race candidates (NMC) | NMC Winners | NMC Losers |
|---|---|---|---|---|---|
| White | 0.73 | 0.80 | 0.16 | 0.12 | 0.19 |
| Black | 0.14 | 0.09 | 0.43 | 0.49 | 0.37 |
| Hispanic | 0.11 | 0.08 | 0.33 | 0.30 | 0.35 |
| Asian | 0.02 | 0.02 | 0.09 | 0.09 | 0.10 |
| Other | 0 | 0 | 0.002 | 0.003 | 0 |
| Female | 0.29 | 0.29 | 0.30 | 0.34 | 0.27 |
| Male | 0.72 | 0.71 | 0.70 | 0.66 | 0.73 |
| Republican | 0.33 | 0.32 | 0.19 | 0.14 | 0.24 |
| Democrat | 0.50 | 0.54 | 0.66 | 0.77 | 0.56 |
| N | 19,360 | 1,828 | 1,828 | 930 | 989 |

**Table 2. Effect of Nonmodal Race Candidate Victory on Council Racial Diversity**

| | Diversity measure | | | |
|---|---|---|---|---|
| | Share of council is nonmodal | Share of council matches nonmodal candidate's race | Fractionalization | Polarization |
| Nonmodal victory | 0.077*** | 0.155*** | 0.103*** | 0.209*** |
| | (0.016) | (0.015) | (0.02) | (0.027) |
| N | 2,257 | 2,257 | 2,257 | 2,257 |

Notes: Observations are candidate-council pairs. Councils in the same city but in different election years are treated as distinct councils. While the number of distinct councils is 1,380 as in Table 1, multiple nonmodal candidates can run for seats on the same council.

**Table 3a. Effect of Nonmodal Race Candidate Victory on Other Councilor's Next Election Outcomes**

| | (1) Vote share | (2) Election is contested | (3) Runs for reelection |
|---|---|---|---|
| All councilors | -0.0004 | 0.0085 | -0.0169 |
| | (0.0136) | (0.0095) | (0.021) |
| | 13,800 | 17,330 | 31,456 |
| Councilors that match NMC race | 0.0265 | 0.0271 | 0.0139 |
| | (0.0349) | (0.0283) | (0.0508) |
| | 2,839 | 3,349 | 6,152 |
| Councilors that do not match NMC race | 0.0037 | 0.0063 | -0.0291 |
| | (0.0154) | (0.0121) | (0.0243) |
| | 10,961 | 13,981 | 25,304 |

Notes: Column (1) includes all other councilors (not the nonmodal or modal candidate) who decided to run for reelection and were contested. Column (2) includes all other councilors who decided to run for reelection. Column (3) includes all other councilors.

**Table 3b. Effect of Nonmodal Race Candidate Victory on Other Councilor's Next Election Outcomes (Large councils)**

| | Vote share | Election is contested | Runs for reelection |
|---|---|---|---|
| All councilors | 0.0586*** | 0.0136 | -0.0727*** |
| | (0.0153) | (0.015) | (0.0233) |
| | 12,150 | 15,465 | 27,222 |
| Councilors that match NMC race | 0.0841** | 0.0553 | 0.0397 |
| | (0.039) | (0.0391) | (0.0563) |
| | 2,623 | 3,112 | 5,616 |
| Councilors that do not match NMC race | 0.0434** | 0.0056 | -0.088*** |
| | (0.0193) | (0.0186) | (0.0277) |
| | 9,527 | 12,353 | 21,606 |

Notes: Column (1) includes all other councilors (not the nonmodal or modal candidate) who decided to run for reelection and were contested. Column (2) includes all other councilors who decided to run for reelection. Column (3) includes all other councilors. "Large councils" are defined as those with at least the in-sample median number of seats, which is 7.

**Table 3c. Effect of Nonmodal Race Candidate Victory on Other Councilor's Next Election Outcomes (Small councils)**

| | Vote share | Election is contested | Runs for reelection |
|---|---|---|---|
| All councilors | -0.0316 | -0.0052 | 0.0368 |
| | (0.0214) | (0.0108) | (0.0307) |
| | 1,650 | 1,865 | 4,234 |
| Councilors that match NMC race | -0.1129** | 0.0024 | -0.0467 |
| | (0.0555) | (0.008) | (0.0966) |
| | 216 | 237 | 536 |
| Councilors that do not match NMC race | -0.0029 | -0.006 | 0.0311 |
| | (0.0215) | (0.0136) | (0.0349) |
| | 1,434 | 1,628 | 3,698 |

Notes: Column (1) includes all other councilors (not the nonmodal or modal candidate) who decided to run for reelection and were contested. Column (2) includes all other councilors who decided to run for reelection. Column (3) includes all other councilors. "Small councils" are defined as those with less than or equal to the in-sample median number of seats, which is

**Table 4. Discussion Topics and Assigned Labels**

| Label | Topic |
|---|---|
| Public commentary 1 | city, people, council, community, public, really, need, meeting, lot, look, mayor, give, day, member, call, back, great, business, first, question |
| Closing procedure | yes, motion, item, discussion, city, approve, second, please, consider, council, authority, dollar, call, regular, next, meeting, number, resolution, hundred, reconvene |
| Official commentary 1 | yes, look, city, need, people, put, back, could, mean, lot, talk, question, something, na, gon, council, kind, really, motion, meeting |
| Public commentary 2 | city, council, people, look, question, public, need, kind, community, could, move, project, use, back, meeting, talk, lot, put, item, ask |
| Public commentary - zoning | city, look, tree, council, yes, need, public, back, question, could, give, business, project, people, street, lot, number, plan, really, item |
| Parks | city, bicycle, bike, farmer, project, pedestrian, council, art, plan, item, branch, park, meeting, lane, trail, report, resolution, commission, number, public |
| Budget | budget, fund, dollar, revenue, tax, million, increase, city, look, thousand, percent, rate, need, money, pay, hundred, question, cost, point, general |
| Zoning legislation | motion, city, second, yes, item, property, approve, project, aye, street, question, council, public, ordinance, favor, number, discussion, resolution, bid, move |
| Housing | plan, area, urban, land, city, housing, development, look, really, need, project, density, use, community, growth, people, corridor, process, lot, impact |
| Official commentary 2 | city, sioux, look, fall, really, project, plan, community, need, question, council, service, people, talk, lot, staff, kind, process, program, system |
| Inauguration | constitution, nomination, swear, council, election, motion, second, nominate, city, duty, discharge, mayor, clerk, yes, please, meeting, member, office, elect, appoint |
| Small talk | ah, yes, sun, day, let, wow, hello, today, oh, web, love, software, city, water, look, life, already, king, truth, nothing |
| Public commentary 3 | city, meeting, yes, council, look, question, motion, people, need, public, give, dollar, back, really, could, ask, community, something, day, first |
| Public hearing procedure | motion, item, commissioner, county, second, sioux, yes, aye, number, unanimously, dakota, question, approve, public, hearing, comment, commission, pass, lien, morning |
| Legislation | substitute, defer, bill, number, motion, councilmember, amendment, council, city, committee, favor, second, meeting, vote, aye, public, properly, discussion, member, move |

| | |
|---|---|
| Zoning | city, really, look, people, hotel, lot, downtown, parking, use, building, unit, need, fire, plan, area, community, question, space, talk, council |
| Public development | project, look, park, building, really, space, lot, design, city, kind, area, parking, use, could, need, back, cost, talk, plan, people |
| Public housing | city, housing, dollar, yes, township, public, tax, fund, council, thousand, hundred, program, redevelopment, item, second, agency, motion, project, question, million |
| Opening procedure | yes, city, motion, second, resolution, ordinance, council, please, move, call, meeting, whereas, number, councilman, committee, mayor, clerk, report, item, roll |
| Education | community, people, city, housing, really, school, need, student, council, look, lot, talk, program, way, affordable, could, member, kind, support, question |

Notes: Only the 20 highest-weighted words for each topic group are shown here.

**Table 5. Topic Relevance in City Council Meetings and Correlations with Race Shares**

| | | Correlation with council characteristics | | | | |
|---|---|---|---|---|---|---|
| Label | Mean | Share White | Share Black | Share Hispanic | Share Asian | Share Female |
| Public commentary 1 | 15.268 | 0.123 | -0.1 | -0.139 | 0.12 | 0.062 |
| Closing procedure | 1.904 | -0.001 | 0.001 | 0.003 | -0.002 | 0.001 |
| Official commentary 1 | 17.682 | -0.107 | 0.148 | 0.015 | 0.003 | -0.219 |
| Public commentary 2 | 1.828 | 0 | -0.001 | 0.001 | 0 | 0.001 |
| Public commentary - zoning | 1.829 | 0 | -0.001 | 0.001 | 0 | 0.001 |
| Parks | 2.188 | 0.003 | -0.006 | 0.004 | 0.005 | 0.007 |
| Budget | 7.59 | 0.009 | 0.002 | -0.016 | -0.06 | -0.001 |
| Zoning legislation | 9.017 | -0.048 | 0.026 | 0.056 | 0.075 | 0.045 |
| Housing | 2.896 | 0.005 | -0.006 | 0 | -0.048 | -0.003 |
| Official commentary 2 | 5.999 | -0.002 | -0.008 | 0.037 | -0.093 | 0.029 |
| Inauguration | 2.421 | -0.002 | 0 | 0.003 | 0.007 | 0.003 |
| Small talk | 1.975 | 0 | -0.001 | 0.004 | -0.006 | 0.003 |
| Public commentary 3 | 1.826 | 0 | -0.001 | 0.001 | 0 | 0.001 |
| Public hearing procedure | 3.025 | 0.004 | 0.011 | -0.027 | -0.043 | -0.036 |
| Legislation | 1.861 | 0 | 0 | 0.001 | 0.001 | 0.002 |
| Zoning | 1.851 | 0 | -0.001 | 0.001 | 0 | 0.001 |
| Public development | 4.388 | 0.03 | -0.023 | -0.024 | -0.073 | 0.008 |
| Public housing | 3.028 | 0.023 | -0.025 | -0.008 | -0.008 | 0.008 |
| Opening procedure | 6.03 | -0.049 | 0.005 | 0.119 | 0.15 | -0.005 |
| Education | 7.393 | 0.012 | -0.02 | -0.032 | -0.03 | 0.089 |
| sums | 99.999 | 2.44E-09 | 2.33E-10 | 3.14E-09 | -0.002 | -0.003 |
| Column sum | 100.001 | -2.10E-09 | -0.001 | -0.001 | 0.001 | 3.49E-09 |

**Table 6. Regression Discontinuity Effect of Nonmodal Race Victory on Topic Relevance**

| Topic label | Mean | Overall | Small councils | Large councils |
|---|---|---|---|---|
| Public commentary 1 | 15.26 | 6.758** | 9.727*** | 4.477 |
| | | (2.932) | (3.817) | (4.857) |
| Official commentary 1 | 17.68 | 0.843 | -0.817 | 6.989** |
| | | (3.106) | (6.862) | (3.418) |
| Public commentary 2 | 1.82 | -0.154** | -0.11 | -0.155** |
| | | (0.049) | (0.080) | (0.078) |
| Public commentary - zoning | 1.82 | -0.154*** | -0.120 | -0.155* |
| | | (0.049) | (0.079) | (0.078) |
| Parks | 2.18 | 0.310 | 2.770 | -1.24 |
| | | (1.028) | (1.824) | (1.231) |
| Budget | 7.58 | 0.011 | 0.934 | -1.585 |
| | | (1.049) | (1.478) | (1.473) |
| Zoning legislation | 9.01 | 6.060** | 5.257* | 8.397*** |
| | | (2.593) | (3.110) | (3.025) |
| Housing | 2.89 | 0.084 | -0.125 | -0.016 |
| | | (0.195) | (0.172) | (0.271) |
| Official commentary 2 | 5.99 | 2.256*** | 1.898 | 1.485 |
| | | (0.798) | (1.334) | (3.472) |
| Public commentary 3 | 1.82 | -0.155*** | -0.09 | -0.156** |
| | | (0.049) | (0.074) | (0.079) |
| Legislation | 1.86 | -0.135*** | -0.131* | -0.146* |
| | | (0.054) | (0.079) | (0.080) |
| Zoning | 1.85 | -0.151*** | -0.119 | 10.128* |
| | | (0.050) | (0.083) | (0.080) |
| Public development | 4.38 | -1.313 | -2.927 | -0.120 |
| | | (2.451) | (5.522) | (0.906) |
| Public housing | 3.02 | -0.848*** | -0.197 | -1.299*** |
| | | (0.325) | (0.205) | (0.4501) |
| Education | 7.39 | -2.821 | -1.755 | -10.248*** |
| | | (2.306) | (4.419) | (2.949) |
| | 7,684 | 7,684 | 5,422 | 1,567 |

Notes: “Large councils” are defined as councils with at least 7 seats.

**Table 7. Negative Sentiment Classification Examples**

| State | City | Year | Sentence | Vader Negativity Score | TextBlob Negativity Score | Roberta Negativity Score |
|---|---|---|---|---|---|---|
| CA | West covina | 2021 | the police department failed to implement the homeless plan from 2018 | 25.9 | 50 | 88.97993 |
| CA | West covina | 2019 | and im very disappointed | 45.9 | 97.5 | 91.19859 |
| IA | Waterloo | 2019 | thats just absolutely not true | 34.3 | 17.5 | 90.87516 |
| CA | Glendale | 2020 | because its a very brutal way to make brutal and unsophisticated way to make budget reductions | 45.1 | 93.75 | 90.20453 |
| CA | Yuba | 2022 | um so bad news there | 48.7 | 70 | 91.74459 |
| AL | Mobile | 2020 | i completely disagree | 59.1 | 10 | 67.10091 |
| SD | Sioux falls | 2020 | thats wrong | 60.8 | 50 | 78.69519 |
| NJ | Jersey | 2021 | its unacceptable | 75 | 0 | 86.04488 |
| NJ | Paterson | 2022 | no one cares | 82.8 | 0 | 53.35014 |
| CA | Yuba | 2018 | i say thats wrong | 50.8 | 50 | 67.65696 |
| FL | Orlando | 2019 | hes insane | 57.4 | 100 | 74.28967 |

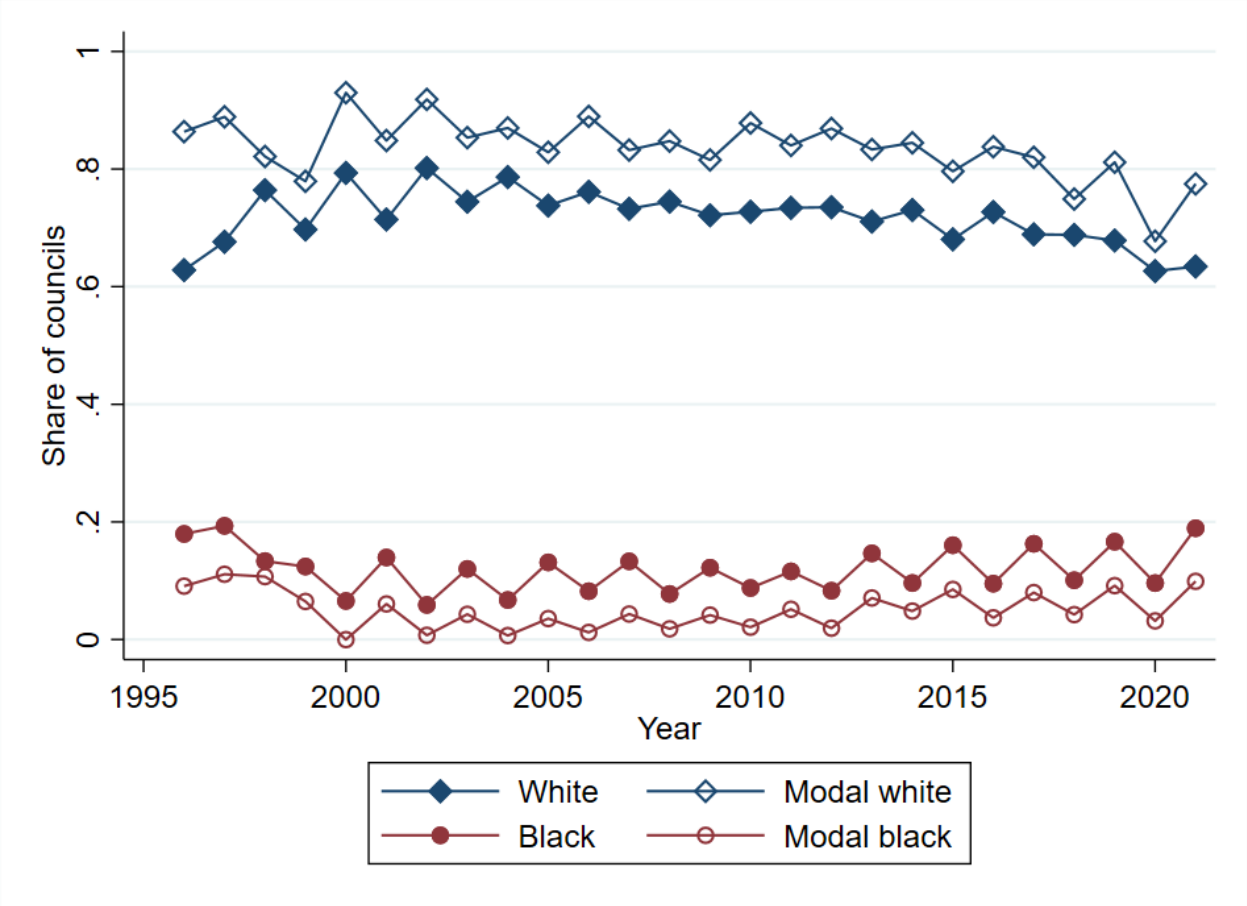
Notes: This table displays negative sentiment analysis scores for selected sentences from city council meetings in the transcript data. A sentence is overall classified “negative” from these scores if the majority of scores are above 33, and the negative scores are larger than scores for positive and neutral.

**Table 8. Effect of Nonmodal Race Candidate Victory on Council Meeting Sentiment**

| | Share Negative | Share Positive | Share Neutral | Share Subjective |
|---|---|---|---|---|
| Baseline average | 0.024 | 0.174 | 0.778 | 0.174 |
| Main estimate | 0.0084** | -0.0046 | -0.0022 | 0.0023 |
| | (0.0038) | (0.0077) | (0.0075) | (0.0094) |
| Below median council size | 0.0201*** | -0.0007 | -0.0141 | 0.0182 |
| | (0.0075) | (0.0155) | (0.0161) | (0.0165) |
| Above median council size | -9.37E-06 | 0.0002 | 0.0003 | -0.0002 |
| | (0.0023) | (0.0075) | (0.0059) | (0.0064) |
| NMC is not incumbent | 0.0123*** | -0.0064 | -0.0028 | -0.0036 |
| | (0.0039) | (0.0091) | (0.0096) | (0.0109) |
| NMC is incumbent | -0.0077 | -0.0177 | 0.0063 | 0.0604*** |
| | (0.0092) | (0.0141) | (0.0085) | (0.0161) |
| Meeting early in term | 0.0036 | -0.0073 | 0.0107 | 0.0034 |
| | (0.0051) | (0.0147) | (0.0106) | (0.0131) |
| Meeting late in term | 0.0109* | 0.0015 | -0.0149 | 0.0102 |
| | (0.0061) | (0.0115) | (0.0134) | (0.0114) |
| N | 8,835 | 8,835 | 8,835 | 8,835 |

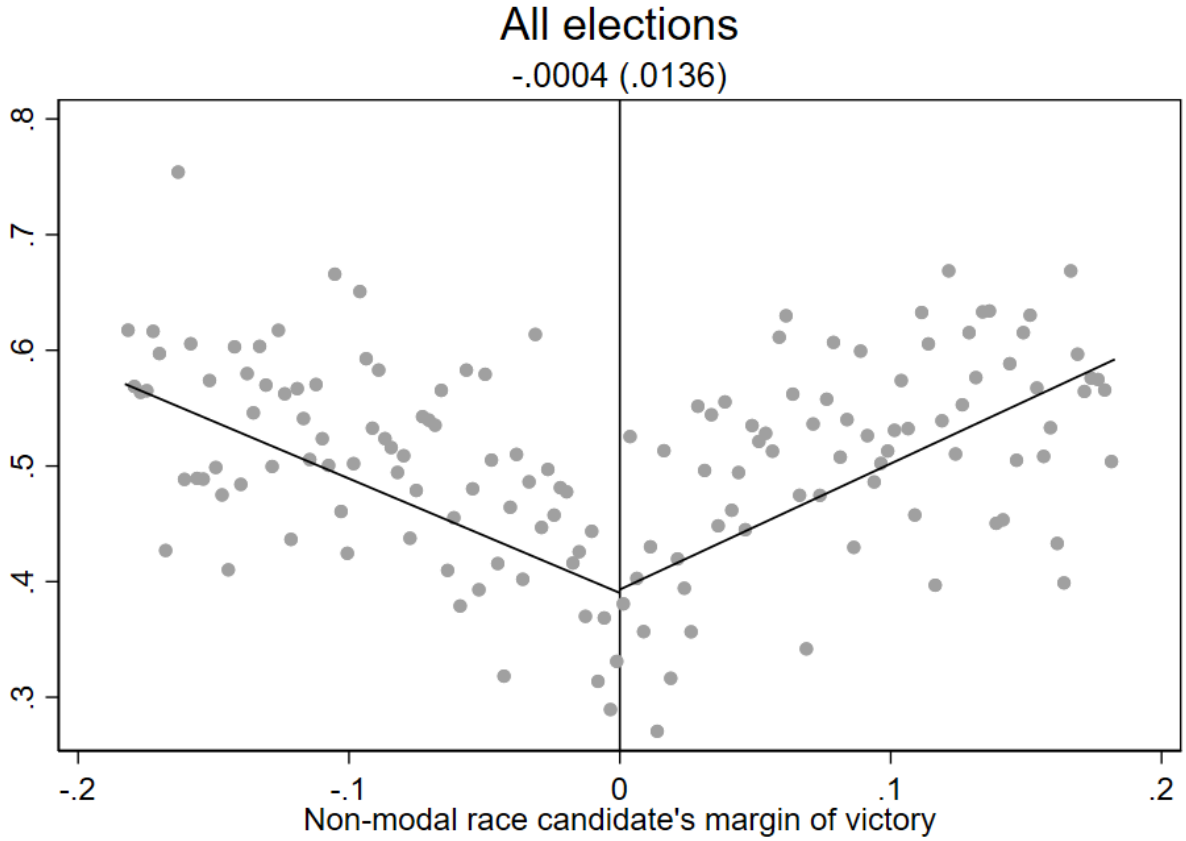
Notes: Each cell is a separate regression, with outcomes in the column names and first row showing the sample average of that outcome.

**Figure 1. City Council Racial Diversity Over Time**



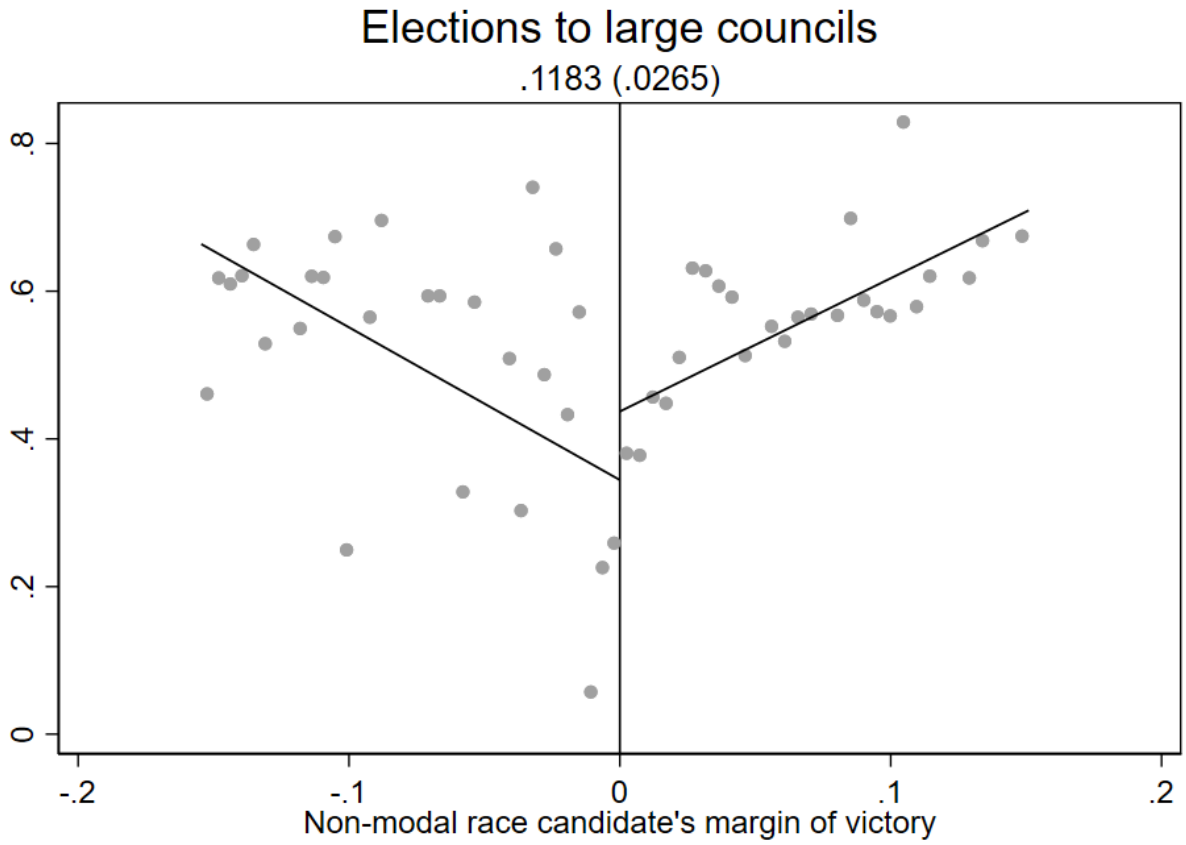

Notes: This figure shows what percentage of sample councils are modal Black or modal White, and what percentage of total councilors across all councils are Black or White.

**Figure 2a. Effect of Nonmodal Race Candidate Victory on Other Councilor's Next Election Vote Share**



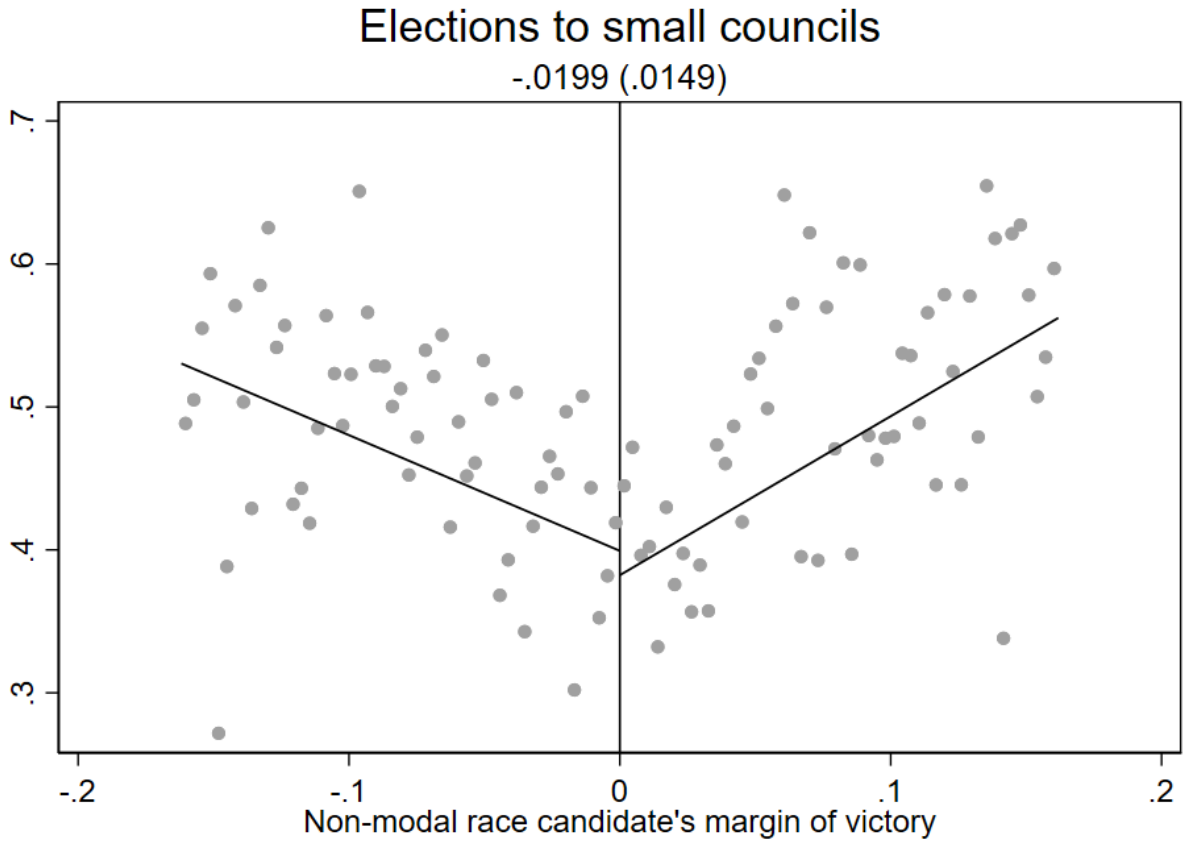

Notes: This figure displays binned next-election vote shares for other councilors by nonmodal candidate vote share in the current election. Figure is restricted to data within the optimal bandwidth. Regression discontinuity estimate with council size weights is included in the subtitle.

**Figure 2b. Effect of Nonmodal Race Candidate Victory on Other Councilor's Next Election Vote Share (Large councils)**



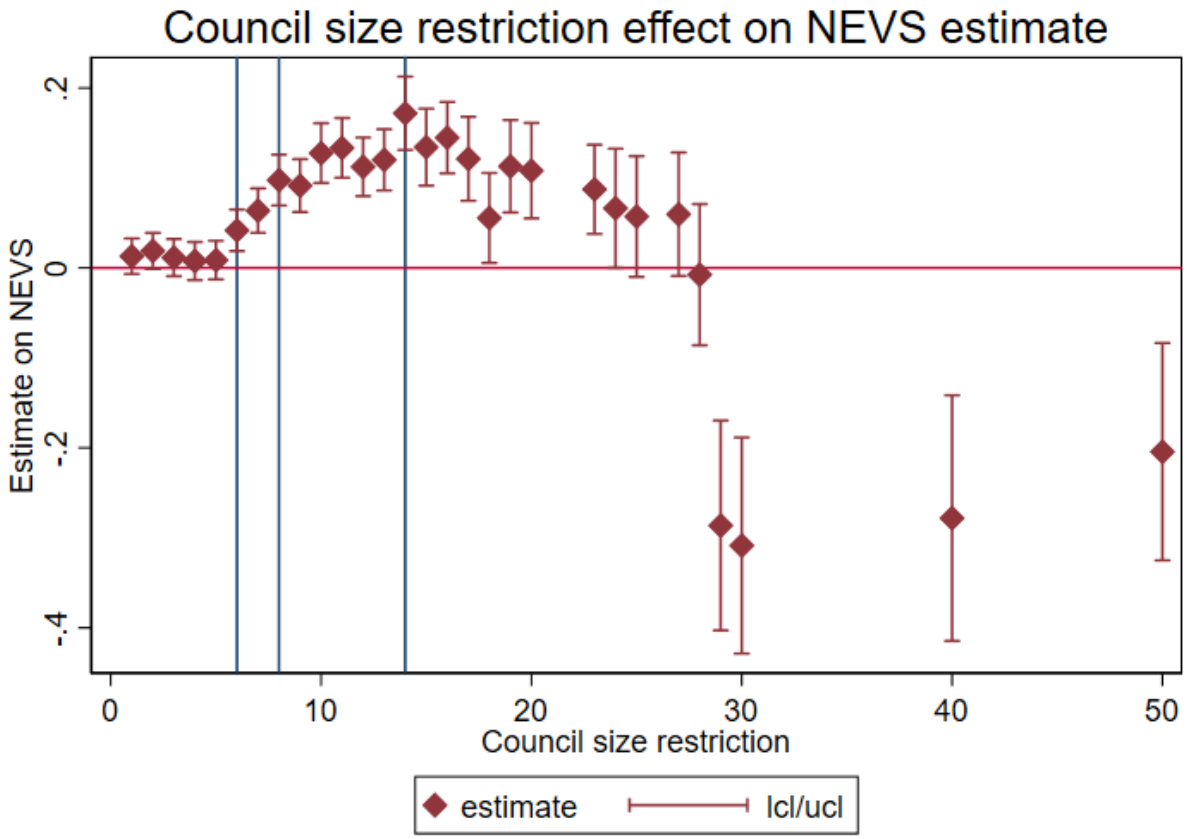

Notes: This figure displays binned next-election vote shares for other councilors by nonmodal candidate vote share in the current election. Figure is restricted to data within the optimal bandwidth. Regression discontinuity estimate with council size weights is included in the subtitle.

**Figure 2c. Effect of Nonmodal Race Candidate Victory on Other Councilor's Next Election Vote Share (Small councils)**



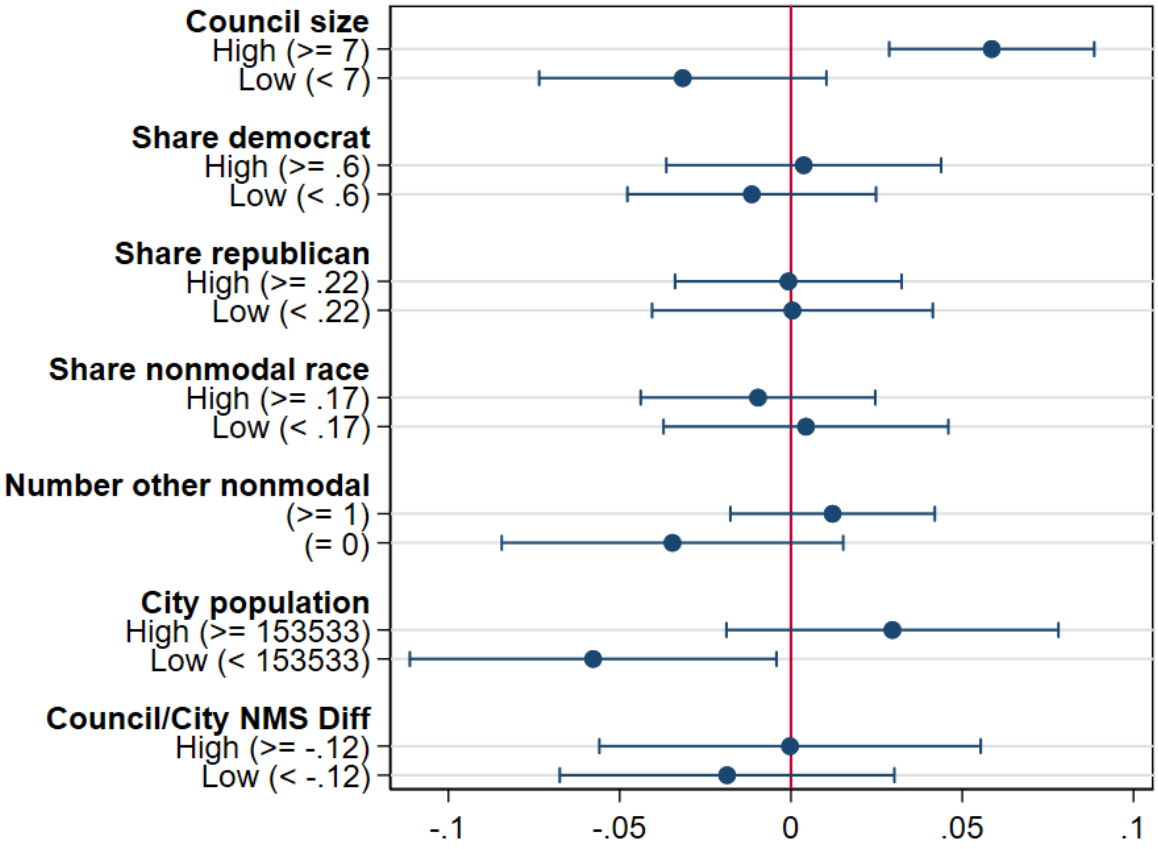

Notes: This figure displays binned next-election vote shares for other councilors by nonmodal candidate vote share in the current election. Figure is restricted to data within the optimal bandwidth. Regression discontinuity estimate with council size weights is included in the subtitle.

**Figure 3. Council Size Restriction Effect on Main Estimate**




Notes: This figure displays regression discontinuity estimates on the effect of nonmodal victory on next election vote shares (NEVS) for other councilors for successively more stringent restrictions on council size. The x-axis indicates the minimum required council size for the estimate. Blue lines indicate quartiles of data.

**Figure 4. Heterogeneity in the Effect of Nonmodal Race Victory on Other Councilors' Next Election Vote Share**



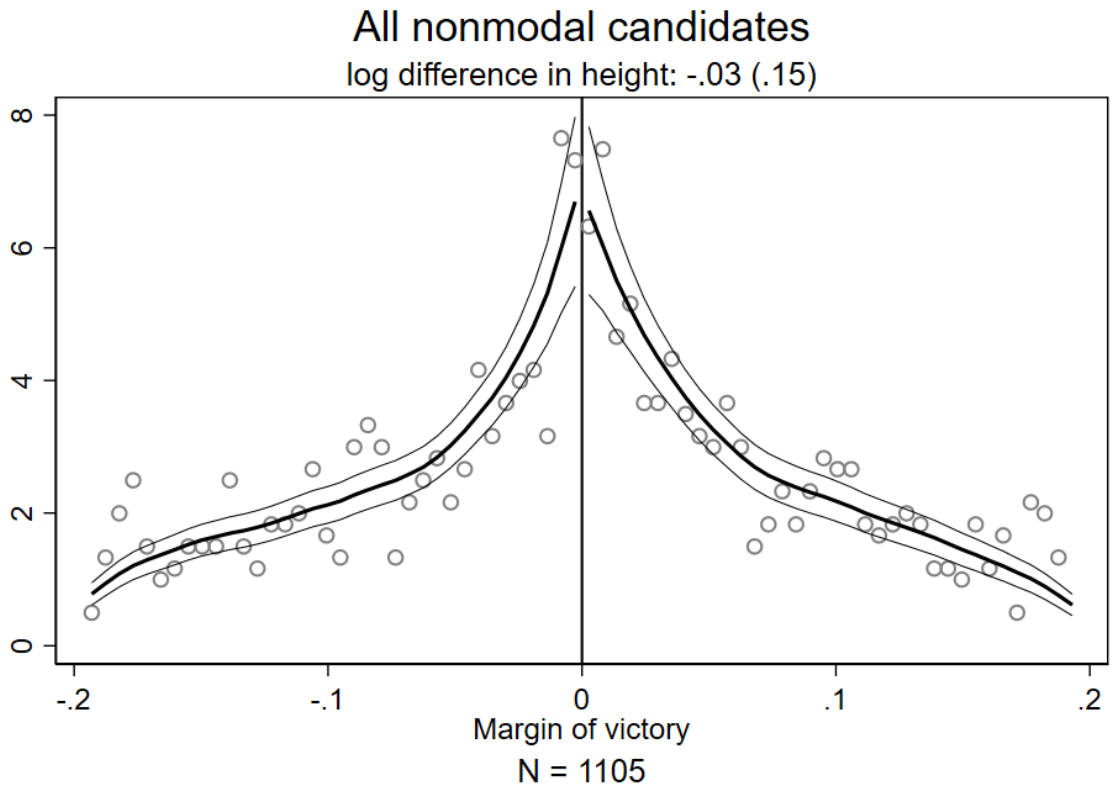

Notes: This figure displays heterogeneity in the effect of nonmodal victory on other councilors' next election vote shares for a variety of council and city characteristics.

**Table A1. Continuity of Other Covariates Across Nonmodal Victory Cutoff**

| Variable | Baseline mean | RD Estimate | RD standard error | RD p value |
|---|---|---|---|---|
| Female | 0.306143 | -0.02446 | 0.087498 | 0.779826 |
| Democrat | 0.713998 | 0.051408 | 0.093503 | 0.582458 |
| Republican | 0.183283 | 0.037673 | 0.068912 | 0.5846 |
| Total votes | 20527.84 | -4263.72 | 8513.707 | 0.616507 |
| City population | 588636.8 | 184.2145 | 64127.52 | 0.997708 |
| City share White | 58.47795 | 0.348955 | 3.70588 | 0.92498 |
| City share Black | 18.74693 | -1.77062 | 2.913605 | 0.543381 |
| City share Asian | 8.69416 | -0.67115 | 3.089014 | 0.827997 |
| City share Hispanic | 30.19648 | 4.562503 | 4.39468 | 0.299183 |
| City share high school graduate | 24.24421 | -0.5628 | 1.178275 | 0.632902 |
| City share in labor force | 58.98047 | -0.55798 | 0.998699 | 0.576361 |
| Median household income | 53245.95 | 4633.667 | 4168.883 | 0.266358 |

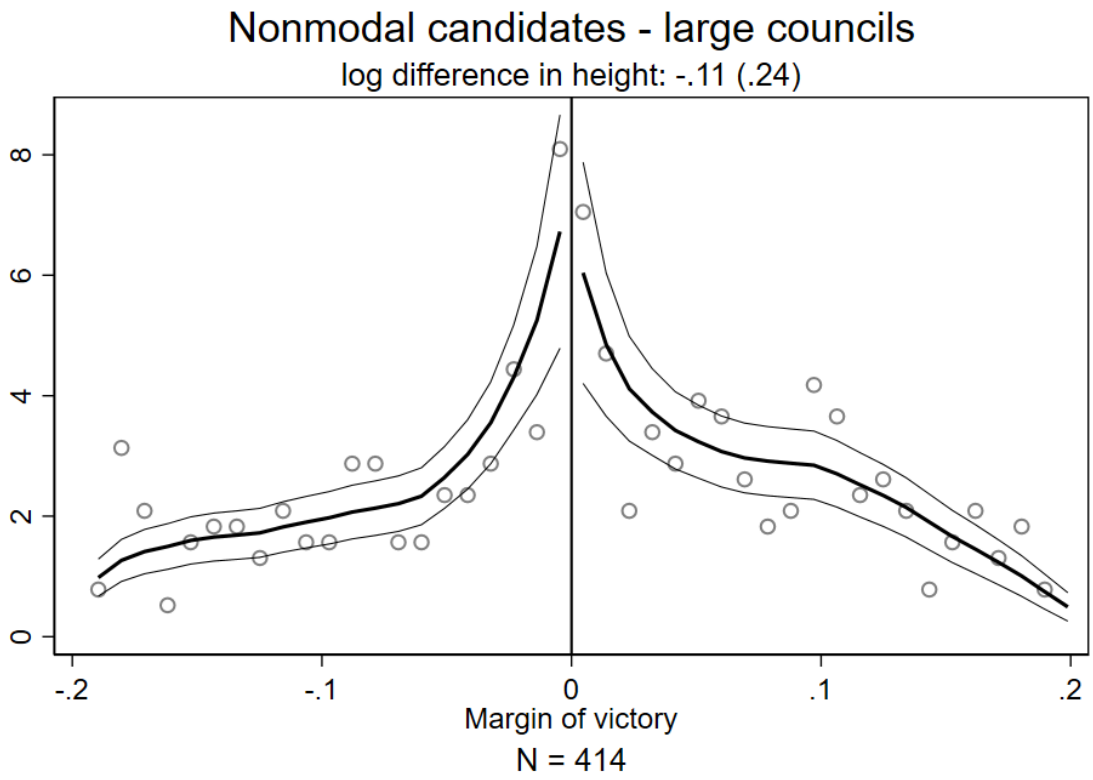
Notes: This figure displays RD estimates of nonmodal victory on a variety of pre-election candidate and city characteristics.

**Figure A1a. Tests for Density Shifts at the Cutoff**



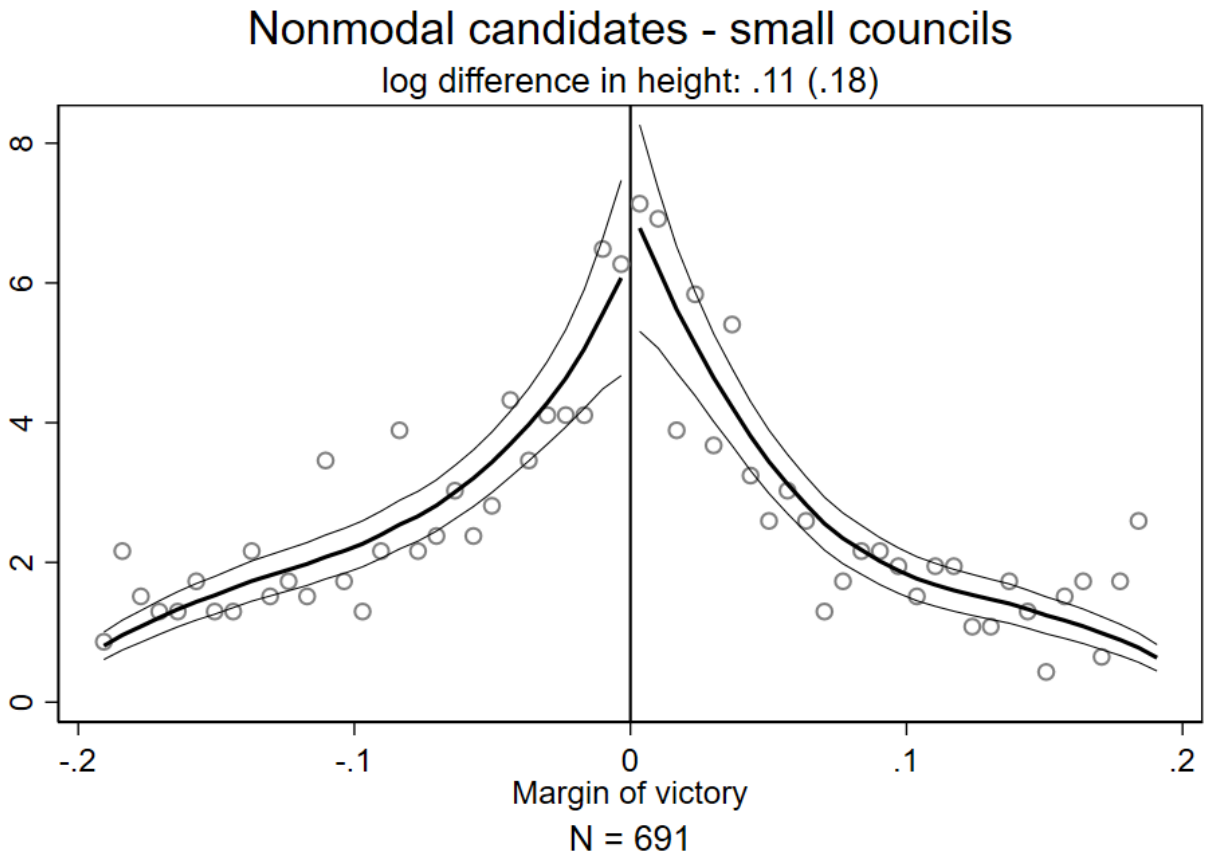

Notes: This figure displays a standard McCrary (2008) test for shifts in density at the nonmodal victory cutoff. Data are binned and local polynomial regressions are fit on both sides of the cutoff according to McCrary's procedure. The log difference in height at the cutoff is displayed in the subtitle.

**Figure A1b. Tests for Density Shifts at the Cutoff**



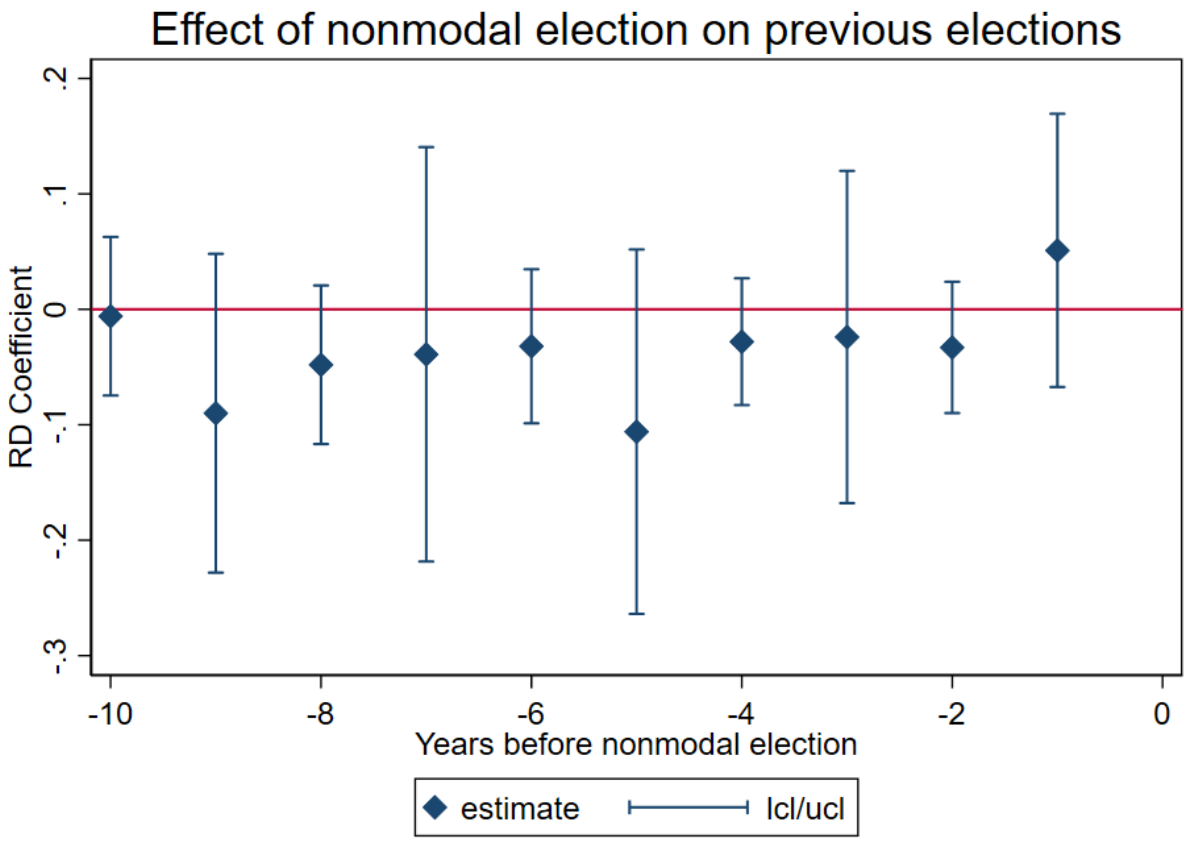

Notes: This figure displays a standard McCrary (2008) test for shifts in density at the nonmodal victory cutoff. Data are binned and local polynomial regressions are fit on both sides of the cutoff according to McCrary's procedure. The log difference in height at the cutoff is displayed in the subtitle. "Large councils" are defined as those with equal to or more seats than the in-sample median, which is 7.

**Figure A1c. Tests for Density Shifts at the Cutoff**



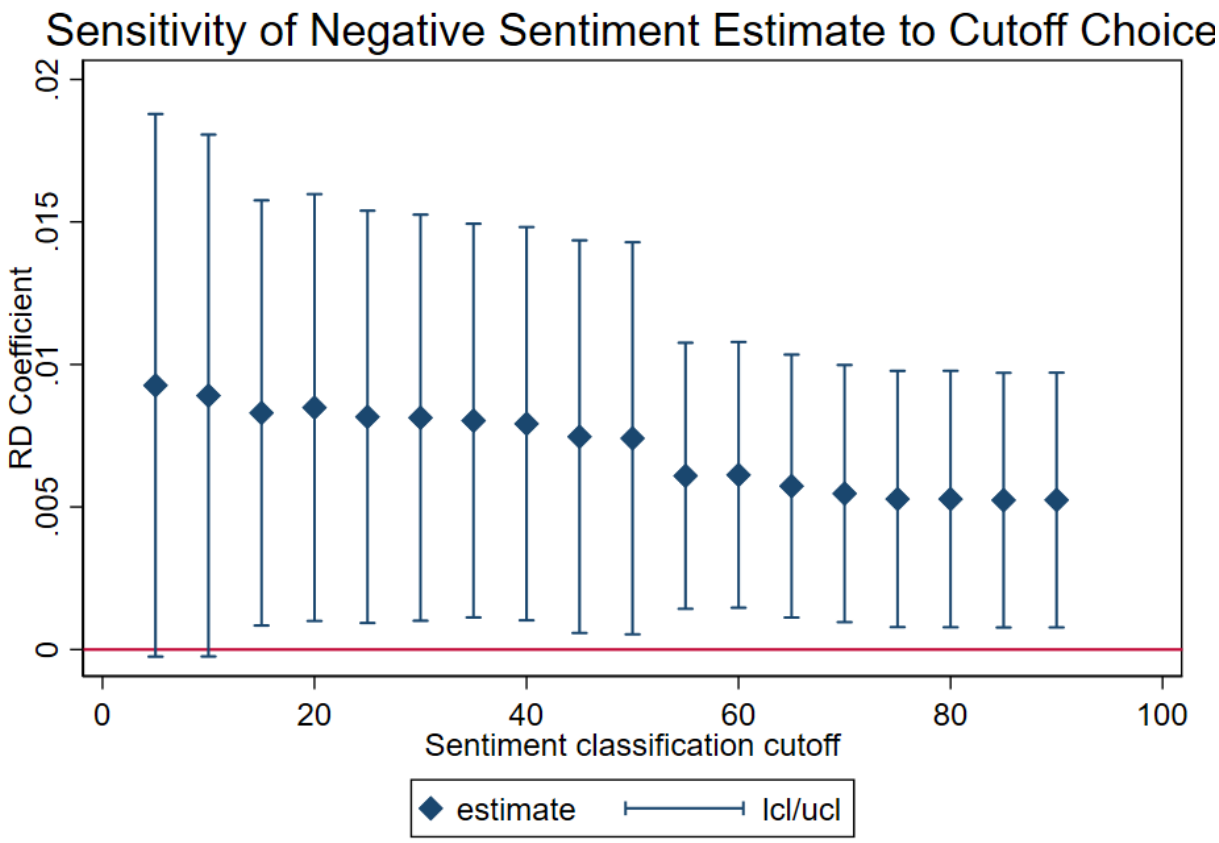

Notes: This figure displays a standard McCrary (2008) test for shifts in density at the nonmodal victory cutoff. Data are binned and local polynomial regressions are fit on both sides of the cutoff according to McCrary's procedure. The log difference in height at the cutoff is displayed in the subtitle. "Small councils" are defined as those with equal to or fewer seats than the in-sample median, which is 7.

**Figure A2. Test for Effect of Nonmodal Race Candidate Victory on Vote Shares in Previous Elections**




Notes: This figure displays placebo estimates on the effect of nonmodal victory on vote shares for other councilors in past elections.

**Figure A.3 Sensitivity of Negative Sentiment Estimate to Classification Cutoff**




Notes: This figure displays estimates of the effect of nonmodal victory on the share of council meeting sentences classified as negative, with varying cutoffs for determining classification.