Demographic Composition's Impact on Group Communication and Effectiveness: Evidence from the Racial Composition of U.S. City Councils

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Abstract

The debate surrounding demographic compositions in organizations has intensified in recent years, spurred by claims that different compositions can improve group decision-making and performance. Yet despite significant attention and investment in initiatives driving changes in group compositions, evidence on the effects of group composition on group outcomes is limited. This paper provides new evidence in the U.S. city council setting nationwide. Leveraging quasi-random victories in close elections between different-race candidates, I use a regression discontinuity design to estimate the impact of racial compositions on city council communication and effectiveness. Applying natural language topic modeling and sentiment analysis techniques to 17,045 city council meeting transcripts, I show that changes in composition enhance information exchange, but also heighten communication frictions – increasing negativity in council meetings by 66%. In line with theories on effects in groups of different sizes, larger councils see greater shifts in discussion topics and only modest changes in negativity, while smaller councils see an increase in negativity five times greater than large councils. These competing communication effects and heterogeneity by council size are reflected in compositional effects on incumbent vote shares, a measure of council effectiveness. Changing composition improves future vote shares by 6.7 points in large councils, with little to no effect for smaller councils. Together, these results suggest that composition's impact on communication plays a key role in determining the effectiveness of group efforts.

1 Introduction

The push for changes in demographic compositions in organizations has intensified in recent years, driven in large part by claims of its practical benefits for group performance. Proponents argue that such changes enhance decision-making, innovation, and financial performance, with top consulting firms like McKinsey & Company, Bain & Company, and Boston Consulting Group suggesting team demographic composition is key to boosting revenue and employee retention. The demographic composition-focused human resources consulting market is projected to reach a $30 billion valuation by 2033.[1] However, skepticism is growing. The Economist notes a surge in hiring based on demographics since 2010, yet recent corporate and governmental backpedaling suggest increasing doubts about the effectiveness of these initiatives. Given the growing interest in and implementation of these initiatives, a natural question is whether these initiatives are likely to be effective, and more generally, how demographic composition influences group performance, and the channels through which its effects operate.

Theories from economics and social psychology suggest that demographic composition can either enhance or hinder group performance through its effects on communication. These theories highlight two primary mechanisms through which demographic composition influences group performance: an increased opportunity for new 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). Understanding the role of communication is central to understanding demographic composition's effects on group behavior and outcomes. While varied groups may benefit from broader perspectives and enhanced information exchange, they may also face higher communication costs. Group size also plays a key theoretical and qualitative role in demographic composition's effects, with several studies suggesting that smaller groups may suffer from particularly strong frictions (Wegge et al 2008; Robert and Romero 2017; Park 2020).

Despite the policy interest and theoretical motivation, empirical research on demographic composition's effects is limited, often focusing on specialized, smaller-scale settings.[2] These

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

[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).

studies are unable to examine the role of communication as a mediating factor and contain little variation in group size. These exclusions are notable given the varying capacity for intragroup communication across these settings, and the theoretical tension between the potential positive and negative effects of demographic composition and its relationship to group size.

This paper provides new evidence on the effect of racial composition on group communication and effectiveness in a high-impact, nationwide setting: U.S. city councils, which offer key advantages for studying demographic composition. First, city councils make impactful decisions affecting hundreds of thousands of constituents, shaping critical policies such as zoning, policing, housing, and health. Second, council-based governance is common worldwide, so demographic composition in this setting could have meaningful implications for many localities outside of the U.S. as well. Third, the varying sizes of city councils nationwide permit analysis of how demographic composition's effects scale with group size. Finally, city council meetings provide extensive opportunities for group interaction and communication, which plays an essential theoretical role in demographic composition's effects. These council meeting records are publicly available, allowing me to open the black box and examine how demographic composition affects performance through changes in communication that other studies have been unable to quantify.

To estimate the effects of city council racial demographic composition, I leverage the quasi-random variation in winners of close 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 barely win or barely lose elections to the city council. I identify composition-altering candidates based on the council's modal race; candidates who do not match the council's most common race, running against a candidate who does match, will necessarily create a more varied composition if they win. I refer to these composition-varying candidates as *nonmodal race candidates*. The outcome of these contests is an exogenous shock to council composition, suitable for identifying the causal impact of electing a candidate that modifies council racial composition.

This setting allows me to explore the effects of demographic composition on outcomes at each stage of the political process: council deliberations, downstream election results, and ultimately city-level outcomes. I first discuss effects on council communication, and then results on measures of council effectiveness.

Guided by theories on how demographic composition can influence group communication, I first quantify how racial composition influences city council deliberation in two ways**:** information exchange and communication friction, and disentangle the opposing roles these channels play in how demographic composition can shape group effectiveness. I employ natural language topic modeling and sentiment analysis techniques on 17,045 city council meeting transcripts to identify latent discussion themes and disagreement and conflict in council meetings, and use these as outcomes in the regression discontinuity framework. Theoretical and experimental research suggests that demographic composition facilitates the exchange of new ideas and different perspectives, which should be reflected in shifts in discussion topics. In support of this hypothesis, I find a change in council demographic composition reallocates council discussion time in subsequent meetings toward public input and increases deliberation on infrastructure-related legislation. However, disagreement also intensifies. Electing a nonmodal race candidate increases the share of negative sentiment within a meeting by 3.9 percentage points – a 66% increase from baseline. Consistent with theories on the different effects of demographic composition for different-sized groups, these effects strengthen when accounting for council size heterogeneity. Larger councils experience greater and more precise shifts in discussion time, but only a 1.6 percentage point rise in negativity. [3] In contrast, smaller councils see a 7.7 percentage point increase in negative sentiment – nearly five times greater.[4] These results show that demographic composition meaningfully reshapes council deliberation, both by broadening the scope of discussion and by increasing conflict.

How do demographic composition's changes in council communication translate into impacts on council effectiveness? I measure council effectiveness by examining incumbent vote shares, which captures a summary of a city council's impact on their municipality. Vote shares encapsulate how cities respond to council behavior, reflecting public sentiment toward the

[3] "Large" versus "small" councils are decided by the in-sample median number of seats, which is 7. Further discussion of the definition of council size and its interaction with demographic composition is included in Section 3.3.

[4] The sign, significance, and relative magnitudes of the sentiment results are robust to choice of sentiment model.

council's effectiveness. Evidence suggests that voters take city outcomes into account when deciding how to vote, placing emphasis on local economic performance when evaluating incumbents (Whitten and Palmer 1999, Becher and Donnelly 2013, Stiers 2021). Further, reelection is often of primary importance to politicians, who use policy to signal their value to voters (Biglaiser and Mezzetti 1997). Vote shares also offer a consistent measure of how well the council meets evolving local goals, as they are easily comparable across times and localities with differing policy priorities.

I find that changes in demographic composition can cause improvements in incumbent vote shares as a measure of council effectiveness. Results on incumbent vote shares are somewhat mixed, revealing strong heterogeneity in demographic composition's effect by council size, in line with the results on communication: a narrow victory by a nonmodal race candidate increases the vote shares of their fellow incumbents by 6.7 points in large councils, while small councils see no gains in electoral performance.

The heterogeneity in communication and incumbent vote shares reveals a consistent pattern, suggesting that changes in communication may drive changes in group effectiveness: large councils experience greater shifts in discussion topics, minimal increases in negativity, and see gains in electoral performance. In contrast, small councils exhibit minimal shifts in discussion topics, enormous increases in negativity, and see no electoral performance improvements. These results align with theoretical predictions that the benefits of demographic composition are more pronounced in larger groups, where the gains from broader information exchange outweigh the costs of increased communication friction.

Taken together, these results show that demographic composition can have strong, negative impacts on group effectiveness. It can also intensify communication frictions that may hinder group performance. Changes in communication are closely linked to changes in group effectiveness, suggesting that communication is a vital element of demographic composition's effects. Groups that can mitigate these frictions – by being a large group, or in other ways – can enjoy some benefits of demographic composition. Policymakers considering reforms to promote demographic composition in groups – whether in city councils, school boards, corporate boards, or other types of teams – should therefore account for group size and consider institutional mechanisms that mitigate frictions while preserving the potential gains from information exchange.

2 Literature and Institutional Background

In this section, I discuss the key theoretical role of communication as a mechanism for demographic composition's effects, and existing correlational evidence on the role of group size. I examine the current empirical literature on demographic composition's effects, and discuss its limitations related to quantifying communication and incorporating group size. I then argue that the city council setting's many advantages make it well-suited to addressing these limitations.

2.1 Communication Tension in Varied Groups

Demographic composition has the potential to enhance group performance by introducing new perspectives and problem-solving approaches. The widely cited model by Hong and Page formalizes this idea, showing theoretically that cognitively varied groups outperform homogeneous but individually more capable groups (Hong and Page 2004). Since racial composition is often correlated with cognitive (or ideological) variance, it may improve performance through this mechanism (Page 2007, Biasi et al 2025). Other papers in psychology have supported the idea that compositionally varied 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 potential benefits of demographic composition may go unrealized.

Other theoretical models suggest that demographic composition may hinder performance by increasing communication frictions. Modern economic models of workplace demographic composition 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 demographic composition on group performance depends on whether the benefits of information exchange outweigh the potential costs of communication frictions. Empirical work has largely focused on settings where quantifying communication at all, much less disentangling information exchange from communication friction, is impossible. This paper

directly examines these theoretical mechanisms by leveraging city council meeting transcripts to quantify communication changes in response to demographic composition.

2.2 The Role of Group Size

Another key insight of the theoretical and correlational work on group demographic composition is the influence of group size on performance. A common intuition is that demographic composition should have less impact in larger groups, where individual members contribute less to overall decision-making. However, experimental and evidence suggests the opposite. Pereira et al. (2024) argue that in small, homogeneous groups, the marginal contribution of any additional member is relatively high, so the difference in value between adding a homogeneous versus a heterogeneous member is modest. In contrast, as group size increases, the marginal contribution of an additional homogeneous member declines, making the relative value of a heterogeneous member more pronounced. Thus, demographic composition may have a greater positive impact in larger groups, where the additional perspectives are more likely to add unique value.

The idea of larger groups seeing greater net gains from demographic composition is reflected in correlational work in several areas. Wegge et al (2008) find that gender varied teams of tax officers complete complex tax evaluations faster, and that this gender demographic composition effect is more pronounced in larger teams.[5] Evaluating the gains from interest-demographic composition among Wiki contributors, Robert and Romero (2015) find that more varied groups write higher quality articles, and that the quality gains from demographic composition are higher in larger groups of contributors. The authors attribute those quality gains to contributors more easily finding like-minded people to work with in large groups, reducing frictions between people with differing interests. Park (2020), studying public sector organization performance in Korea, finds that boards with greater variety in professional backgrounds perform mildly worse than homogeneous boards when the board is small, but quickly see positive and greater relationships as the size of the board increases.

These findings suggest that studies focusing exclusively on either relatively small or large city councils may misrepresent the broader effects of demographic composition on governance.

[5] These teams of tax officers were recruited from 111 federal tax offices across Germany. These tax evaluations are complex and time-consuming, with officers often consulting eachother with doubts or questions.

This focus can be an incidental consequence of data geography: the number of seats on a city council can be near constant within some U.S. states, while varying in others.[6] The natural variation in city council sizes nationwide provides an opportunity for new insights into how group size moderates demographic composition's causal impacts on groups.

2.3 Causal Evidence on Demographic composition's Effects

Relatively little work in economics has causally examined racial or ethnic demographic composition's effects in real-world groups. Existing work unable to agree on whether demographic composition's effects on group performance are positive or negative. Studies on Dutch exchange student classrooms, production lines in a Kenyan factory, and door-to-door canvassing teams in Kenya find mixed effects of demographic composition on group performance (Hoogendoorn et al. 2013; Hjort 2014; Marx et al. 2015). Investigating politician identity compositions in the political sphere, there are a handful of papers leveraging close victories in local government elections to address a variety of demographic composition-related questions. Beach and Jones (2017) and Beach et al (2024) provide some of the few estimates of city council candidate racial identity's impact on governance, focusing on California over a brief time period. Relatedly, Biasi et al (2025) look at ideological and gender demographic composition on California school boards.

This paper provides a possible explanation for the mixed results across this literature: the capacity for group communication and its role in that group's success varies substantially across these settings. Students may communicate freely and commonly in a classroom, collaborating on projects that can be improved from peer feedback, while production line workers may hardly interact verbally, with well-defined tasks that may not critically depend on group coordination. In Hoogendorn et al's paper on the former, demographic composition sees positive benefits, while Hjort's work on the latter shows performance declines due to demographic composition. The difference in the importance of information exchange for group success between these settings may be one explanation for the mixed results on demographic composition's effects. However, although these papers often acknowledge the role of communication in demographic composition's impacts, they do not directly investigate the critical role communication plays in

[6] California is particularly relevant example, as many studies focus exclusively on elections in California. Incidentally, nearly all city councils in California have exactly five seats, below the national median.

shaping outcomes for varied groups, and quantifying communication at all is nearly impossible in many of their settings. Furthermore, these studies are often limited to examining groups of similar or identical size. This paper contributes to the literature on demographic composition by directly addressing communication mechanisms in racial demographic composition's effect on group performance. The national scope and data-availability of my setting, covering councils of varying sizes and demographic compositions, allows me to provide new evidence on how demographic composition influences group deliberation and effectiveness.

2.4 Advantages of the U.S. City Council Setting

City councils provide an ideal setting for studying the effects of demographic composition on group performance for several reasons. They shape city policy in both immediate and long-lasting ways, are a common governance structure in the U.S., and vary in size across the country. They also provide useful variation in close election victories that is convenient for causal estimation. Critically, city councils operate on group deliberation and often provide extensive documentation of council meeting content, which makes exploration of council communication and decision-making possible.

City council decisions play an important legislative role in shaping local policy. City councils have significant consequences on their areas of governance, affecting public goods provision, budgeting, and local policy implementation for large populations. Beyond constructing or approving city budgets overall, they define the roles and functions of other municipal officers, impose taxes, form public 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). The city council's vital role in approving and funding public works projects to improve city infrastructure is one dimension of understanding the public infrastructure crisis in the U.S. – an estimated $9.1 trillion necessary to bring U.S. infrastructure into a state of good repair (American Society of Civil Engineers 2024 report). Some of this infrastructure disinvestment disproportionately affects historically underserved racial and ethnic populations.[7] Understanding how racial demographic composition shapes city council discussion of infrastructure can lend insight into potential causes of or solutions to this infrastructure crisis in U.S. cities.

[7] According to a Government Accountability Office report on national highways in 2022.

City councils play these vital policy roles across a large geographic area, as council-based governance is a common institutional structure across the United States. Within the U.S., there are 35,705 township and municipal governments (Federal Reserve at St Louis, 2024). In 2008, over 90% of U.S. cities used a form of government featuring an elected council as a significant seat of public power (International City/County Management Association). Examining demographic composition's effects in this context provides insights relevant to a broad range of policymaking bodies, and exploits variation across many different localities, lending additional external validity.

An additional advantage of the city council context is the natural variation in council sizes across localities. This allows for an analysis of how demographic composition's effects scale with the number of councilors in a given council. This is crucial, since theoretical and lab research in psychology and economics shows that group size interacts positively with demographic composition's effects. The national dataset used in this paper allows me to isolate the role of group size in mediating the effects of demographic composition in the real world.

A fundamental challenge in studying the effect of demographic composition in groups is that real-world legislative bodies, teams, and classrooms are almost never formed randomly. City council elections provide a natural source of exogenous variation in group demographic composition that overcomes this challenge. A fundamental problem for studying the causal effect of demographic composition in groups is selection bias. Close elections in which candidates from different racial backgrounds win by narrow margins create as-good-as-random variation in council composition. This quasi-experimental variation allows for credible causal estimation of demographic composition's effects.

Finally, the city council context allows me to open up the black box and explore the effects of demographic composition on communication, and how those effects may differ by council size. City councils operate through deliberative processes, providing ample opportunities for interaction among members and with the public. Council meetings serve as a formal venue for debate, negotiation, policymaking, and receiving feedback from the public. A large portion of regular council meetings is often dedicated to hearing public input and commentary, adding another dimension to demographic composition's effects on group communication: the input from stakeholders in the group. Given that theoretical models emphasize communication as a key mechanism for demographic composition's effects on group output, the city council setting

offers a unique opportunity to test these predictions empirically. I collect transcripts of these publicly available and well-documented meetings, enabling detailed analysis of group interactions. By analyzing city council meeting transcripts, this paper provides direct evidence on how demographic composition shapes communication in ways that impact group performance, allowing for a deeper understanding of the mechanisms at play.

While city councils provide an excellent setting for studying demographic composition's effects, the approach in this paper has some limitations. First, the identifying variation used in this paper comes from closely-decided elections between councilors who differ by race. Results from demographic composition-increasing initiatives could be different, where the alternative candidates for a position may differ by more than just race. Second, the findings may not generalize perfectly beyond deliberative policymaking bodies. The degree to which other groups differ from city councils in ways important for demographic composition's effects may limit external validity. Third, this paper addresses only relatively short-term effects of demographic composition within the length of an election term. Effects due to demographic composition may persist across election years, particularly if varied councils implement different long-lasting city policies. Fourth, meeting transcripts, while offering valuable natural language for capturing effects on communication during council meetings, do not capture informal interactions among council members outside these meetings, which may also influence decision-making. Despite these limitations, this paper offers novel insights into how demographic composition influences group effectiveness through communication and decision-making processes.

3 Empirical Approach

In this section, I detail my approach to estimating demographic composition's impacts on city councils. I describe the national-level data on city council elections I use for analysis. I introduce my method for identifying changes in council racial demographic composition, and how I apply this method to a vote share regression discontinuity (RD) framework. I assess the validity of the vote share RD design in this context, and demonstrate a first stage effect on council racial demographic composition.

3.1 Election Data

I leverage variation in city council elections at the national level using the American Local Government Elections Database (Benedictis-Kessner et. al 2023). This is a database of 77,853 candidates in 57,139 electoral contests across multiple types of city offices in U.S. cities with populations over 50,000 in the 2020 Census. The database covers elections in these cities between 1989 and 2021. In addition to vote totals for each candidate, the dataset provides party affiliation and demographic information, including race and gender, allowing me to estimate the impact of a winning candidate's race on city council outcomes. The large and national nature of the dataset allows me to examine how demographic composition's effects differ across council size and geography, which inform discussions of mechanisms and external validity.

Using the information on historical elections, I construct council membership data for standing city councils to calculate council-level racial composition. For every year between 1989-2021, I use the results of elections in each city to determine the standing council each year until every seat on the council is filled. I then calculate the share of each represented race and the modal race for filled councils (Black, White, Hispanic, Asian, Other).

3.2 Identifying Increases in Council Racial Demographic composition

I measure changes in city council racial demographic composition 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 concentrate on the effects of shifts in demographic composition, I focus on elections where a candidate matching the modal race competes against a candidate who does not match the modal race. I will refer to these candidates who do not match the council's modal race as *nonmodal* candidates, those who do match as *modal candidates*, and elections involving both where one wins and the other loses as *nonmodal elections*. If the nonmodal candidate wins, the racial demographic composition of the council necessarily changes. The outcomes of these contests directly impact council demographic composition, providing a framework for assessing demographic composition's effects on council performance.[8]

[8] In rare cases, this approach could misidentify an increase in racial demographic composition 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 in aggregate. 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.

To provide a baseline on existing racial demographic composition on city councils in my setting, 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 399 cities, with an average population over 200,000. These cities are predominantly White, with Black, Hispanic, and Asian residents comprising the minority on average. The sample covers 4,048 distinct councils over time, with an average size between 7 and 8 seats. In 88% of these councils, the modal race is White. At the candidate level, the data include 19,360 candidates, with 80% of the modal candidates being White. In the final sample, the estimation data consist of 1,828 elections between nonmodal race candidates and their modal race opponents.

3.3 Identifying Demographic composition's Effects Using a Regression Discontinuity Design

These nonmodal/modal election matchups are a convenient setting for causal estimation of demographic composition's impact on groups. Estimating the effects of changing demographic composition presents a notable empirical challenge: the demographic composition of a group – along any dimension, including race – is likely to be correlated with other group characteristics. Isolating demographic composition's effects necessitates ruling out alternative explanations that naturally arise when groups are formed endogenously with other group characteristics. More successful groups may simply attract greater demographic composition, or groups more fraught with conflict may more often invite demographic composition. This issue applies to many kinds of groups, and local elected positions are no exception. Voters may take race into account when deciding how to cast their vote and may naturally encourage or discourage city council racial demographic composition based on other council or city attributes.

To address this core identification issue, I employ a regression discontinuity design with vote share as the running variable. This design leverages the idea that competing candidates very close in vote shares are quasi-randomly assigned to victory. Conditional on having similar vote shares, candidate, council, and city characteristics pre-election (observable or unobservable) should be the same on average within a bandwidth around the victory threshold. Taking

advantage of this quasi-randomness allows me to isolate the effect of electing a candidate who increases the racial demographic composition of the city council.

In implementing this design, I restrict my estimation sample to elections where there are at least two candidates that differ by modal-race status.[9] 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's vote share and the modal race candidate's vote share.[10] 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 council's outcome in election cycle t (council meeting topic share, meeting sentiment, incumbent vote share, or municipal house price), 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 demographic composition of that council. The coefficient on $1[z_i > 0]$, β_1, is the coefficient of interest, capturing the effect of a nonmodal race victory on council outcomes.

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

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[9] 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 lowest vote share winner and the highest vote share loser. These restrictions permit me to isolate the effect of changes in demographic composition while using each election only once as a source of variation.

[10] Cattaneo et al (2016) note that this "normalize and pool" approach in RD settings with multiple cutoffs also pools heterogeneity in the treatment effect. The authors show this is not problematic for identification assumptions if the multiple cutoffs are noncumulative, which is the case in this paper.

3.4 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 precisely manipulate their vote shares in close elections and others cannot, or the ability to precisely manipulate differs between candidates, then underlying characteristics of those candidates could be the real drivers behind any estimated effects, rather than demographic composition itself.[11] If so, the vote share RD design would be invalid for estimating the causal effect of demographic composition. I test for the possibility of manipulation in two standard ways: density tests and checking for continuity in other pre-election variables.

I follow the standard approach laid out by McCrary (2008) for testing for shifts in density across the victory cutoff. In Figure 2, I present a density test for my overall estimation sample.[12] I find no statistically significant shifts in density, consistent with a lack of manipulation of margin of victory.[13]

I also estimate my main specification with 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.[14] I attach additional information from the US Current Population Survey to also test for discontinuities in city characteristics such as population, 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.

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[11] Vogl (2014) shows that mayoral elections that differ by race can exhibit manipulation across the victory threshold. Furthermore, Duzett (2025) provides evidence that city council gender composition is a significant predictor of candidate victory by gender. Together, these papers suggest that assessing the validity of vote share regression discontinuity designs in the local election context is particularly important.

[12] I also present these density tests for councils of different sizes in Figure A.1. These tests also do not exhibit any evidence of manipulation.

[13] I also implement a density test tailored specifically for RD settings with a discrete running variable, proposed by Frandsen (2017). No significant shifts in density are detected using this alternative method.

[14] Turnout is a particularly important covariate to examine for potential discontinuity, as Vogl (2014) finds discontinuities in turnout to be the likely driver behind a disparity in the number of close Black victories in mayoral contests.

3.5 First Stage

The main approach of this paper, in isolating the effects of electing a nonmodal race candidate in a close election, is one way of measuring changes in council demographic composition. To confirm that this design does indeed have a first stage effect on council racial demographic composition, I employ my main specification to estimate the effect of electing a nonmodal race councilor on the share of the council that matches the nonmodal councilors race (including the new councilor). I observe sizable and statistically significant increases in demographic composition for every measure, consistent with changing the candidate race of a single seat on the average city council.

4 Demographic composition and Communication

In this section, I investigate how racial demographic composition on city councils affects how councils communicate. I outline the challenges in quantifying group communication, discuss reasons why the city council setting helps overcome those challenges, and introduce the dataset of city council meeting transcripts I use. I then examine demographic composition's effects council communication with two sets of outcomes: information exchange through topic modeling, and communication friction through sentiment analysis. Using these outcomes, I find evidence that demographic composition affects both channels in city council meetings.

4.1 Quantifying Communication and Transcript Data

Identifying quantifiable changes in communication is essential to understanding how demographic composition influences group performance. The existing literature on demographic composition'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 that impact large populations. Quantifying communication – such as tracking shifts in dialogue, tone, or conflict patterns – is crucial for identifying which of these mechanisms are at play and how demographic composition ultimately influences council effectiveness.

Quantifying communication requires at least three things to be true. First, there must be meaningful intragroup communication. If the benefits of demographic composition operate

through group communication, groups that never communicate are unlikely to see those benefits. Unlike in some settings (e.g., production lines, sports teams) city councils rely on group deliberation and external communication to succeed. Councils meet frequently and for lengthy amounts of time, making it a natural setting for studying group demographic composition. Second, group communication must be recorded in some form to permit analysis. 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, communication must be quantifiable somehow. 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. Unlike in most settings, city councils are uniquely positioned to provide a wealth of communication information to study demographic composition's impacts on group deliberation.

To provide information on city council communication during meetings, I leverage the LocalView Public Meetings Database (Barari and Simko 2023). This is the largest existing dataset of local government public meetings, covering 139,616 transcripts of videos of local government meetings (over 1.2 billion spoken words) publicly uploaded to YouTube, spanning 1,012 places and 2,861 distinct governments across the United States between 2006-2022. The meetings included in this database have been manually examined to verify the posts are about valid local governments, and filtered to ensure such videos are posted regularly and largely unmodified.[15]

The primary advantage of using these transcript data to study group communication is the depth of information provided by natural language. Transcripts provide data on real conversations between participants, with frictions and nuances not captured by summary documents such as minutes (which are subject to a human recorder filter). Such summaries could

[15] Specifically, the authors remove meetings from the database if the channel has posted fewer than five videos, the videos are edited clips, or if the channel appears to only selectively post videos. Rather, the database authors focus on channels/governments that regularly post unedited, meeting-length videos to capture a holistic view of that local government's meetings. More detailed information on the development of the LocalView database can be found in Barari and Simko (2023).

report the result of voting on legislation, but cannot report whether the debate surrounding that legislation was cordial or discordant in ways that could affect the legislation itself, or affect the relationships between legislators in ways that may influence future policies. Advanced natural language processing models can infer these differences in tone from the natural language in transcripts, providing information on how councils communicate beyond the summarized results of their discussion.

Using transcript data comes with limitations. The process for data collection in the LocalView database relies on YouTube's speech-to-text captioning, which can misidentify some spoken words, particularly proper nouns (such as interpreting the spoken word "COVID" as "covet"). Microphone quality, different accents, or other difficulties in interpreting spoken words can introduce a degree of error in the transcript data. Fortunately, the natural language processing models I implement take surrounding words and phrases into account, minimizing the influence of such errors in the transcript data. Another limitation is that these transcript data do not include speaker identifiers. This means I cannot attribute any spoken portion of a meeting to a given councilor or other participant. Author attribution models are imperfect under the best circumstances, and perform especially poorly in speech-to-text contexts which lack many useful written signifiers that such models rely on heavily. Consequently, I cannot identify changes in communication for particular speaker characteristics (e.g., whether changes in communication stem from the newly-elected councilor, or councilors of a particular race).

I attach these city council meeting transcripts to a subset of the city council election data, linking 7,684 meetings to nonmodal elections in my sample.[16] This results in 203 of the nonmodal elections with attached transcripts. These meetings are 9,194 words long on average, meaning the average meeting is roughly 1.2 hours long.[17]

[16] To improve the performance of natural language processing techniques, I use standard methods to clean and restructure the transcript data. I remove in-text pauses, punctuation, and proper nouns. 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.
[17] Assuming 130 spoken words per minute.

4.2 Demographic composition's Effects on City Council Communication

Analyzing these council meeting transcript data, I implement two natural language processing methods to understand how demographic composition shapes communication in city council meetings. First, I use a topic modeling process to estimate how demographic composition changes information exchange through the topics discussed in council meetings. Second, I use a sentiment analysis model to estimate demographic composition's effects on communication frictions in council meetings.

4.2.1 How Does Demographic composition Influence Information Exchange in Council Meetings?

If the way councils exchange information is changing due to demographic composition – as is predicted by theories on how demographic composition affects group processes – changes in demographic composition should result in changes in which topics are being discussed more or less often. I approach quantifying changes in information exchange in city council meetings using topic modeling. Specifically, I employ a standard Latent Dirichlet Allocation (LDA) model to detect latent themes across city council meetings, calculate the share of each meeting dedicated to each topic, then use the regression discontinuity framework to examine how these topic shares shift due to changes in demographic composition.

Topic modeling using transcript data has a distinct advantage in quantifying the actual topics of discussion, as opposed to evaluating topics reported in official documents such as council meeting minutes. Topic modeling captures the emphasis councils place on discussed topics, the time investment in their discussion, and how topics may interweave throughout an entire meeting in ways that may not be found in summary reports recorded by city officials in attendance. Summary reports are also subject to at least one official filter, with human recorders refining the report of the discussion ex post, intentionally or not. In contrast, the topic modeling process takes a hands-off approach to determining the actual content of city council meetings.

The LDA model proceeds in the following manner: it identifies discussion topics by analyzing all city council meetings in the database and treating each meeting as a mixture of topics. It defines each topic as a mixture of words within a meeting that are strongly associated with each other across many different meetings, and orders the words based on relevance for the topic, iteratively updating topic assignments and weights until it converges to a stable set of topic

distributions.[18] For ease of use, I assign a label to each topic by feeding the top 20 most relevant words into a large language model (LLM), and have it assign a short phrase to describe the content of that topic (e.g., the LLM may assign the LDA topic "water, pipes, rain, flow, cost, budget" to the label "water provision"). While the label is useful for interpretation, it is not empirically necessary and has no implications for internal validity.

Table 3 reports a selection of the most prominent topics (word groupings) and the topic labels found by the LDA model. The model itself outputs the words used across many council meetings that constitute a given topic. The model uncovers topics related to public commentary, the city budget, and varied discussions on city infrastructure. A more complete list of the latent topics is included in appendix Table A.2. One notable feature of city council meetings is the dual nature of the meeting content: some portions are spent in active discussion and response, while much of the meeting can be devoted to procedure. Because of this dual nature, I divide topics into two categories based on the content of the highest-weighted words: "procedure topics," where the highest-weighted words often include procedure-related terms such as "motion," "second," or "aye," (signifying the language being used was related to procedure) and "discussion topics," which are more conversational in content. Dividing topics this way provides some insight into how demographic composition may influence information exchange differently across these two core functions of council meetings – procedural governance and open discussion.

The detected topics do have some overlap in the words they contain, which can be a useful feature. Some words common to the public commentary topic across many meetings could be used to discuss the infrastructure topic, and indeed a member of the public may be attending the meeting to complain about the ever-present potholes in their home street. The LDA model detects both elements of that discussion: this is the time the council dedicates to receiving public commentary, and part of that public commentary is about city infrastructure. Another useful example of topic overlap are the topics "Budget" and "Development Finance." Both topics include words such as "dollar" and "tax", but the latter is a specific area of the former that the LDA model has identified as a prevalent area of discussion worthy of its own topic.

[18] The LDA model takes several hyperparameters as inputs, including the total number of topics, which I optimize using a randomized parameter search.

I calculate the share of each meeting devoted to each topic, and use these shares as outcomes in the regression discontinuity framework, investigating how an increase in racial demographic composition changes topic discussion. Since councils with more frequent meetings will receive greater weight in this framework, I weight each observation by the inverse of the number of meetings in that city. This way, the specification treats variation from each election equally.

The results are reported in Table 4. Demographic composition changes topic shares across an array of topics. The amount of time dedicated to public commentary increases by 6.8 (2.9) percentage points due to changes in demographic composition, a 44% increase from baseline (Figure 3A). There is no discernible change in the length of time discussing the city budget. Discussions related to infrastructure decrease somewhat by -0.154 (0.049) percentage points and urban development by -0.151 (0.050) percentage points, decreases of 8.5% and 8.2% respectively. Meeting content related to infrastructure legislation increases substantially by 6.1 (2.6) percentage points, a 67% increase from baseline (Figure 4A). Meeting time dedicated to development finance-related procedure decreases by -0.85 (0.325) percentage points due to a change in demographic composition, a decrease of 28% from baseline.

These shifts in topics due to changes in racial demographic composition on city councils are consistent with the idea that demographic composition changes information exchange in groups. Table 4 shows two overall categories of topics where the content of council meetings changes: city infrastructure and public commentary. While the estimates suggest only modest declines in discussion time for some of these topics, they indicate large increases in the portion of meetings spent on infrastructure-related procedure. The changing discussion around city infrastructure is timely, as yearly reports by the American Society of Civil Engineers have consistently rated the state of U.S. infrastructure poorly across most categories – public parks, schools, roads, transit, and waste all receiving ‘D’ or worse on a scale from A to F (ASCE 2021). Demographic composition on city councils – a political body often responsible for policy decisions around these infrastructure categories – could encourage improved approaches to what has been termed an “infrastructure crisis,” particularly if these changes in city infrastructure discussions can lead to meaningful growth in historically underserved racial communities.

The large effects on public commentary are particularly relevant for evaluating information exchange within meetings. Much of regular city council meetings is devoted to

hearing public input, which can be a valuable source of feedback for the council. There are at least two ways to interpret this increase in public commentary's dominance of city council meetings. First, the public may desire to participate more in city council meetings because the council better represents the city's racial makeup, so citizens are more likely to trust the council with their problems. In fact, cities whose council's racial makeup is closer to the city's racial makeup see 5 to 6 percent more of the meeting dedicated to public commentary on average.[19] Second, it is possible that the increase in public commentary represents an increase in resident complaints, complaining about council actions (or inaction).

Heterogeneity analysis sheds some light on this second explanation. These topic results exhibit strong heterogeneity by council size, in line with the theoretical predictions discussed in Section 2.2. In Figures 3B, 3C, 4B, and 4C, I show that particularly large councils drive the changes in infrastructure discussion, with demographic composition increasing discussion time of urban development by over five times the baseline, while small councils drive the increases in public commentary. Given the qualitative demographic composition literature's prediction on small groups and conflict, this may be driven by the public expressing negativity linked to the change in council demographic composition.

4.2.2 Does Demographic composition Introduce Communication Frictions in Council Meetings?

In addition to effects on topic discussion, theory predicts the potential for demographic composition to introduce communication frictions. I quantify demographic composition's effect on communication frictions in city council meetings using a cutting-edge sentiment analysis model called roBERTa. Many sentiment analysis models are lexicon-based, meaning they assign sentiment scores to individual words or phrases and apply context-based rules to determine whether a sentence expresses positive, negative, or neutral sentiment. The roBERTa approach is more sophisticated, leveraging machine learning techniques to train the model on social media data, and is designed to capture more nuanced sentiment, including sarcasm, irony, and other

[19] I calculate the distance between council racial makeup and city racial makeup by differencing council and city shares of each race in the dataset (Black, White, Hispanic, Asian, and Other) and then averaging those differences. Councils who are below the median of this distance measure (whose racial makeup is closer to the city's) see 5 to 6 percent more of their council meetings dedicated to public input.

complex language features.[20] These underlying tones as well as word choice and other language features are essential components of communication that are captured by natural language, but cannot be identified from summary reports of meetings. I quantify these language features and focus on negative sentiment as a measure of disagreement and conflict, following theories on demographic composition's tendency to intensify performance-inhibiting communication frictions.[21] If demographic composition increases disagreement and conflict in city council meetings, it should be captured by an increase in negative sentiment.

Using roBERTa, I calculate sentiment for each sentence in every meeting in my sample.[22] Examples of sentences in the transcript data with their negative sentiment classifications are available in Table 5. For example, the sentence "because its a very brutal way to make brutal and unsophisticated way to make budget reductions" in a council meeting in Glendale, California has a 90.20 negative sentiment score out of 100 from roBERTa, with the neutral and positive sentiment scores comprising the remaining 9.80 out of 100. While that sentence expresses negativity about city policy, negativity permeates more general forms of discussion as well. Other notable examples of negativity include sentences displaying stark disagreement or conflict, such as "but youre a dumb idiot and a moron", "i completely disagree", and "you shouldnt be throwing around words like felony like im an idiot," all from meetings in different cities, states, and years.

I use the sentence-level sentiment measures to create a meeting-level average of negative sentiment (i.e. what percent of the sentences in a given meeting are more negative than neutral or positive).[23] I find that 5.9% of the average meeting is comprised of negative sentences. I use the

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[20] The base roBERTa model (and its variants), trained on tweets hand-coded by human raters, sees accuracies around 70% to 76% (Loureiro et al 2022, Abercrombie et al 2025). As human raters typically agree on sentiment classifications 74% to 80% of the time, the roBERTa model is quite comparable to classifications by human raters (Abercrombie et al 2025).

[21] One could argue that some disagreement could be productive rather than problematic for council deliberation. Language used to identify negative sentiment may identify language used for debate that ultimately improves deliberation. However, results from Holman, Johnson, and Simko (2024), who calculate correlations between negative sentiment measures and conflict in school board meetings, suggest that negative sentiment measures in public meetings largely capture conflict in disagreement, as opposed to productive debate. Additionally, later heterogeneity analysis on city and election outcomes in this paper reveals that increases in negative sentiment are related to relative declines in council electoral performance.

[22] I later find the sign, significance, and relative magnitudes of the estimates on demographic composition's effects on negative sentiment are robust to other sentiment analysis models as well.

[23] Sentiment analysis models are often designed to evaluate sentiment in smaller segments 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

meeting-level sentiment average as my primary outcome for evaluating demographic composition's effects on communication frictions.

I estimate demographic composition's effects on negative, positive, and neutral sentiment in city council meetings using the regression discontinuity framework. In Figure 5 panel A, I find that electing a racial demographic composition-increasing candidate in a close election increases the amount of negative sentiment in council meetings by 3.9 (0.006) percentage points, an increase in 66.1% from baseline. This increase in negativity crowds out positive and neutral sentiment somewhat equally.

Assessing the heterogeneous effects of demographic composition on negativity by council size in Figure 5 panels B and C, I confirm predictions from theory and experiments, finding that smaller councils exhibit more negativity in response to demographic composition. Councils with fewer than seven members experience a 7.7 percentage point increase, nearly five times larger than the increase in negativity in large councils (1.6 percentage points).[24] This council size heterogeneity in demographic composition's effect on communication frictions is mirrored in the topic results, where small councils drive both the increase in public commentary and the increase in negativity, suggesting a possible association. This provides some evidence that the public's response to council demographic composition may be less than supportive in small councils.

How do these negative interactions between councilors evolve over time? One popular theory, called the contact hypothesis (Allport 1954), suggests that discriminatory behavior and conflict between groups of different identities can be attenuated if the different identities are given equal standing in a cooperative task, and interact regularly over time. Previous work has examined the contact hypothesis in experimental settings, and found some promise (Lowe 2021). With increased exposure or contact, the conflict may subside. City councils provide an interesting setting to examine the contact hypothesis.[25]

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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.

[24] One possibility is that the heterogeneous rise in negativity is mechanically driven by the new councilor, since councilors on smaller councils are likely allotted more time to speak than on larger councils. However, because councils usually consist of 5–9 members and assuming speaking time is roughly equally allocated, differences in individual speaking time due to council size are too small to plausibly explain the fivefold increase in negativity seen in smaller councils.

[25] The cooperative nature of legislatures is somewhat disputable, particularly if members compete directly for seats during elections. However, in many of the cities in my sample, councilors are elected by districts (as opposed to at-large), with most council members not competing with each other for their seat.

To examine the concept of conflict-reducing contact for racial demographic composition in the city council setting, I estimate heterogeneity in demographic composition's effect on negativity in two ways: by meeting timing, and by candidate incumbency. First, by examining timing, I look at the negativity effects of demographic composition early in the nonmodal councilor's term versus later, which speaks to how negativity due to demographic composition can evolve over time, and whether that evolution is consistent with the contact hypothesis. In Table 6, I find no significant difference between increases in negativity in the first half of the election term and in the latter half. Second, I examine candidate incumbency, another way of capturing familiarity between councilors that is necessary for the contact hypothesis. I find that electing an incumbent nonmodal candidate actually decreases negativity in subsequent council meetings relative to a modal race challenger, and substantially increases the amount of positive sentiment.[26] This suggests that some familiarity can form between councilors with different racial identities (or with public or other official participants) and reduce negativity over a more extended time period than the length of a single election term.

The topic modeling and sentiment analysis results together provide evidence in favor of both predicted channels for demographic composition's effects. Changes in demographic composition can change the way councils communicate, shifting topic focus consistent with changes in information exchange, but can also intensify communication frictions. Given the theoretically conflicting effects of demographic composition on these channels, in the next section I estimate the net impact of demographic composition on council effectiveness, connecting its influence on these communication channels with outcomes at both the council and city levels.

5 Demographic composition and Group Effectiveness

Given the significant changes in council communication – stark topic shifts and dramatic increases in negativity – a natural question is whether these communication changes due to demographic composition translate into meaningful differences in how well city councils do their

[26] This does not imply that challenger status, rather than candidates' differences in racial demographic composition, drives the overall increase in negativity caused by demographic composition. In Table A.1, I find that nonmodal race candidates across the victory cutoff are equally as likely to be incumbents, challengers, or running in an open election. Rather, incumbents may be less likely to introduce (or be the cause of introducing) negativity into council meetings, and the increase in negativity due to racial demographic composition can be somewhat attenuated by incumbency.

job. I examine demographic composition's impact on a downstream measure of council effectiveness: incumbent vote shares, and then investigate effects on house prices as a less-clear, but complementary outcome. I then link demographic composition's impacts on communication and effectiveness impacts together to provide a broad overview of how demographic composition influences deliberative groups.

5.1 Measuring City Council Effectiveness

City councils perform a wide variety of functions in local government, which complicates council evaluation. What makes one city council more effective than another? I use incumbent vote shares as measure that arguably encapsulates many of the council's responsibilities and how city councils impact their municipalities.

I first leverage incumbent vote shares as an implicit performance evaluation of city councils. Incumbent council vote shares are a useful metric for evaluating council performance for three reasons. First, it is one of the few revealed-preference ways voters have for evaluating councils. When city residents observe the council's policy choices or observe local conditions in consequence of council governance, they often incorporate this information into their voting behavior, rewarding incumbent councils perceived as effective and punishing councils that are less effective (Ferejohn 1986, Whitten and Palmer 1999, Healy and Malhotre 2013, Stiers 2021, Boudot-Reddy and Butler 2024). This concept of voter behavior – often referred to as "retrospective voting" – implies that incumbent vote shares encapsulate many of the things city residents care about (Nordhaus 1975). Second, vote shares are easily comparable across times and localities with varying policy priorities. 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 those 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. Third, city councilors are politicians, usually interested in reelection, and if they are

forward looking, councilors shape their actions during their term to increase their chances of reelection according to their beliefs about voter behavior (Lucas et al 2024). This makes vote shares not only a metric useful for voters, but informative for councilors, and may be a metric for which they optimize their behavior during their legislative tenure.

Incumbent vote shares have many strengths as a metric for evaluating city councils, but are an imperfect proxy for council effectiveness. I discuss four such limitations. First, local elections are often low-information, limiting voters' ability to evaluate council behavior.[27] However, voters can still observe relevant city-level outcomes affected by council behavior without directly observing council action, perhaps overcoming some of the low-information nature of local elections. For example, a voter may not closely follow the development of recent legislation targeted at improving road infrastructure, but can still notice the potholes being filled on their street. Second, voters may hold councils responsible for outcomes outside of the council's control, such as short-term economic shocks or national trends. As the vote share regression discontinuity design leverages variation in close elections across cities, this concern has minimal ramifications for internal validity. Third, local elections usually have low turnout, meaning only some residents' preferences are encapsulated in vote shares. With that said, the residents who do vote are likely to be those who are most invested in the election's outcome, and therefore the most relatively informed set of residents. Finally, voters may ignore council behavior and city outcomes completely, and vote purely based on demographics, for or against varied councils based on their taste for varied representation. While the values stakeholders place on group demographic composition independent of group processes is itself interesting, this dilutes the value of vote shares as a council effectiveness measure. Despite these limitations, because incumbent vote shares aggregate voter judgments across a wide array of city outcomes, electoral performance still provides a useful metric for how constituents judge the effectiveness of varied councils.

To view the consequences of council racial demographic composition form another angle, I also examine racial demographic composition's impact on local house prices. This approach examines how residents can "vote with their feet," encapsulating a varied council's influence

[27] In "low information" elections, voters may possess little knowledge of candidate policy stances or qualifications, or the responsibilities of the elected office. Voters in these elections may rely on heuristics such as party affiliation or candidate demographics to make their vote (Brockington 2003).

over improvements to city amenities relevant for the price of homes. A substantial literature in economics uses house prices as a summary metric for amenities and public service provision. Black (1999) shows that house prices capture a measure of school quality, while Chay and Greenstone (2005) and Linden and Rockoff (2008) find housing prices incorporate environmental quality and safety respectively. More broadly, property values have been used to evaluate the impact of local governments' influence over public good provision and amenities (Deller and Maher 2009). House prices are particularly relevant in the city council deliberation context, as infrastructure and land use regulation are among the topics of policy deliberation most impacted by council racial demographic composition, as I show in the previous section on communication. Prior work shows the substantial role of land use restrictions in shaping property values (Turner et al 2014). This suggests that property values are a natural way of capturing some of the local economic consequences of how demographic composition shifts council deliberation.

However, the value of house prices as an effectiveness measure for city councils is less clear than for incumbent vote shares. Affordable housing is a particularly salient issue among underserved racial minorities. A Pew Research poll in 2021 found that 57% of Black and 55% of Hispanic residents in the U.S. say housing affordability is a major problem in their communities. Likely in consequence, the price of housing is a common policy target for racial minority city councilors. For example, in 2019, the city council in Seattle, Washington passed a collection of "Mandatory Housing Affordability" (MHA) bills, requiring developers to either construct affordable housing units within their new development, or contribute to a public fund that supports future affordable housing development. According to M. Lorena Gonzalez, one of the city councilors at the time, these policies were aimed to influence residential racial demographic composition:

> "Requiring more affordable housing in our most vibrant neighborhoods is long overdue. Today's passage of MHA now means we can manage growth in a way that will promote a more racially and economically varied Seattle rather than a city that is increasingly limited to those who can afford housing choice."

The nature of house prices as a policy target for city councils complicates it as an outcome measure of council effectiveness. On the one hand, council racial demographic composition may promote policies that contribute to higher-value city amenities, putting upward pressure on house prices. Beach et al (2024) provides evidence consistent with this channel: electing a non-white candidate (vs a white candidate) to city councils reduced pre-existing gaps in housing values in California. On the other hand, policies relating to housing affordability may put downward pressure on house prices. The evidence on new affordable housing construction is mixed, with the new homes being treated as price-increasing or price-decreasing amenities in different areas. Diamond and McQuade (2017) show that while affordable housing programs can improve home prices in low-income areas, they also lead to price declines in higher-income areas. Beyond policies chasing new affordable housing construction, there is evidence that local governments can target lower prices through demand-side policies—not just by building subsidized units. Short-term rental restrictions reduce prices by ~2% (Koster, Ommeren, and Volkhausen 2021). Foreign-buyer taxes have reduced prices in targeted municipalities, with short-run effects ranging from ~5% to 9% in Vancouver and Toronto respectively (Du, Yin, and Zhang 2022). This tension in policy priorities for varied councils renders the effect of racial demographic composition on house prices ambiguous, and its value as a measure of council's effectiveness unclear.

Together, these two measures – incumbent vote shares as an effectiveness measure and local house prices as one measure of council impact – encapsulate a wide array of council actions and responsibilities. Examining both provides a more holistic view of how demographic composition shapes group processes, and governance in this particular setting.

5.2 Council Demographic composition's Impact on Council Electoral Performance

I first present results on how electoral performance is shaped by council racial demographic composition. For every election involving a nonmodal race candidate, I estimate the impact of the nonmodal candidate's close election victory on each resulting councilmember's vote shares in their next election within 4 years. I omit the focal councilor (the nonmodal race councilor if they were victorious, or their modal race opponent otherwise).

Figure 6A reports a noisily-estimated 1.71 percent (1.55) increase in incumbent vote shares when the nonmodal race candidate wins a close election.

Following both the qualitative literature on demographic composition in groups of varying sizes and the council size heterogeneity discovered in the communication results in the previous section, I estimate heterogeneous effects of demographic composition on electoral performance by council size. The results reveal stark differences. Figure 6B shows that large councils (with seven seats or more) exhibit a 6.72 percent (1.66) gain in vote shares in their next election due to the nonmodal candidate's victory. In Figure 6C, small councils (with fewer than seven seats) see essentially no gains, instead facing a noisy -0.5 percent (4.1) decline in future vote shares.

The effects, both for overall estimates and for both large and small councils, are robust to varying bandwidth size (Figure A4): up two twice and half the mean squared error optimal bandwidth computed using the approach proposed 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 RD smoothness assumption, I perform a battery of placebo tests. In Figure A5, I test whether the election of a nonmodal candidate predicts increases in vote shares for other councilors up to 4 years (1 to 2 election terms) 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 electoral performance.

One potential identification concern is whether low- or high-performing councilors are differentially likely to seek reelection in response to a change in racial demographic composition. 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 two methods. First, I assume leavers would have received a vote share equal to the average of their votes share in previous elections. Reestimating demographic composition's effect with this assumption yields an increase of 4.8 percent (1.2). Second, 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 percent (1.7) in next election vote share. Regardless of the method, accounting for the possibility of selection on extreme values of leavers' latent characteristics still yields a

significant, positive effect of racial demographic composition on council performance for large councils.

The estimated 6.7 percentage point increase in incumbents' subsequent vote shares in large councils following a change in demographic composition represents a nontrivial shift in electoral outcomes. In the context of local elections, where median winning margins are typically around 20 percentage points, an average gain of this size would be sufficient to change the outcome in roughly 21 percent of city council elections. Put differently, if the average city council election is decided by less than five percentage points—as is the case for nearly 16.5 percent of elections in the full city council election data—a 6.7-point gain could flip the result in a meaningful share of contests. Thus, improvements in electoral performance caused by changes in racial demographic composition are large enough to plausibly alter political outcomes.

5.3 Council Demographic composition's Impact on Municipal House Prices

I next examine how racial demographic composition within city councils translates into changes in local house prices, as one measure of a more varied council's impact on their municipality. If demographic composition improves the quality of council decision-making or broadens the scope of neighborhood investments, one might expect corresponding increases in local house prices following a close election that results in a more racially varied council.

To measure these effects, I merge Zillow's seasonally adjusted and smoothed city-level home value indices (ZHVI) from 2000–2024 to the sample of close nonmodal elections. For each city-year, I compute the log of the average home value, deflated using the national Consumer Price Index, to create an adjusted housing price. I then estimate the impact of a nonmodal race candidate's close election victory on log house prices up to 8 years following the election (two to four election terms), including the first pre-election year's adjusted house price as a control to improve precision.[28]

Figure 7A reports no significant shift in house prices within 8 years following a nonmodal race candidate's victory.[29] Following the communication and electoral heterogeneity

[28] The version without the lagged control is included in the appendix (Figure A6). It exhibits no substantial differences in point estimates compared to the version with the control. As the control improves precision, I continue with that version as my preferred specification.

[29] Point estimates on a subsample of elections only in California where the nonmodal candidate is nonwhite are similar in magnitude to findings in Beach et al (2024) (victory leads to ~6% incline in low-tercile house prices).

patterns documented above, I again split by council size. These results are similarly noisy, with some suggestive differences by council size. Figure 7B shows that large councils (seven or more members) experience a -7.5 percent (4.4) decrease in home values five years after the demographic composition-increasing election. While not significant at conventional levels, the point estimates for large councils suggest a general decline in house prices over time. In contrast, small councils (fewer than seven members) exhibit no such trend (Figure 7C).

These findings underscore the ambiguity of housing prices as an outcome of council racial demographic composition. Councils may simultaneously pursue policies that raise property values through investments in public goods and amenities, while also seeking to reduce housing costs through affordability initiatives. The relative emphasis on these objectives likely varies across cities depending on local housing markets, demographic composition, and political priorities. In growing or supply-constrained cities, more varied councils might favor inclusivity and affordability, intentionally moderating house prices. In contrast, in cities where amenity investment is a more dominant concern for councils, changes in demographic composition could lead to higher housing demand and values. The mixed and statistically insignificant results here possibly reflect this underlying policy tension.

The housing results also help contextualize the vote share findings. Unlike voters' retrospective assessments of council performance, housing markets may respond slowly to policy shifts, often beyond a single election cycle. Voters may therefore evaluate varied councils based on other criteria before any tangible price effects materialize. Moreover, to the extent that a sizable share of voters values housing affordability more than property value appreciation, policies that stabilize or modestly lower house prices could be rewarded in elections even if they reduce market valuations. This interpretation aligns with the null effects found here, and reemphasizes the value of incumbent vote shares as a council effectiveness measure, which naturally capture different policy priorities across cities.

5.4 Linking Communication and Effectiveness in Varied Councils

The analysis of varied councils in this paper across several outcomes (information exchange, communication frictions, incumbent vote shares, and municipal house prices) begs the question: how are demographic composition's impacts on communication and group effectiveness related? Many theories cite communication as the primary mechanism for

demographic composition's effects on groups. In previous sections, I have shown that racial demographic composition on city councils both changes information exchange – through the topics of council discussion – and intensifies communication frictions in council meetings. These results complement existing theories on demographic composition, where these communication channels play opposing roles in determining the effectiveness of varied groups. I have also shown that racial demographic composition can make councils more effective, sizably increasing their chances of reelection.

Heterogeneous effects by council size across all outcomes in this paper paint a vivid picture of the relationship between demographic composition's effects on communication and its impacts on council effectiveness. On large councils, demographic composition drives changes in discussion topics, has modest effects on negativity, and improves incumbent vote shares by 6.7 percent. On small councils, demographic composition has minimal impacts on discussion topics, nearly doubles negativity in meetings, and has little to no impact on incumbent vote shares. These heterogeneous effects by group size are consistent with a small qualitative and experimental literature on demographic composition in groups of varying sizes, suggesting that varied groups generally perform better as they grow larger, and with more muted or even negative performance associations in smaller groups (Wegge et al 2008, Robert and Romero 2015, Park 2020, Pereira et al 2024). This paper provides new causal evidence that, wherever demographic composition causes councils to communicate better, it also causes them to perform better. This suggests that communication is an important component of demographic composition's effects.

6 Conclusion

This paper provides new causal evidence on how racial demographic composition shapes communication and effectiveness in decision-making groups. Using a national dataset of U.S. city council elections, I exploit close contests between candidates of different races to identify the effects of electing a demographic composition-increasing candidate on council communication, electoral performance, and local house prices. The results reveal that demographic composition meaningfully alters how councils deliberate and the outcomes they produce. Councils that become more varied broaden their scope of discussion, devote more time

to public input, and engage more deeply with infrastructure and land-use issues—topics directly tied to local economic performance. Yet changes in demographic composition also increase disagreement, particularly in smaller councils, where intensified frictions appear to offset potential informational gains.

The results exhibit a broader pattern that suggests that communication plays a pivotal mediating role in demographic composition's effects. The councils that communicate more poorly perform poorly in future elections. This illuminates communication as a key mechanism through which demographic composition affects group performance. These results reconcile the mixed empirical evidence across organizational settings by showing that the sign and magnitude of demographic composition's effects depend critically on the group's ability to absorb and manage the frictions that changes in demographic composition introduce.

While this paper contributes to the causal literature on demographic composition by examining a broad, impactful setting in city councils nationwide and quantifying changes in communication, the approach does come with limitations. First, city councils represent a specific type of deliberative body, where formal procedures and public participation have substantial roles. The results may therefore differ in organizations where decision-making is less structured or more private. Second, the analysis focuses on formal, recorded communication, leaving open how demographic composition influences informal discussions that occur outside official meetings. Third, I examine racial demographic composition, which serves as an imperfect proxy for the cognitive demographic composition emphasized in theoretical models. Nevertheless, given that most current policy debates focus on visible forms of demographic composition (race, gender, etc.), the results directly inform these ongoing discussions. Finally, because the regression discontinuity design identifies effects only in close electoral margins, the estimates apply primarily to settings where candidates differ minimally apart from race. In many other settings, policymakers likely consider pools of candidates who differ along many characteristics in addition to race.

The results in this paper carry important policy implications for group formation and management. Policymakers and organizational leaders considering demographic composition-promoting reforms, or managing groups that are already varied, should consider how demographic composition shapes group communication, and can introduce destructive negative

frictions. Institutions that rely heavily on deliberation – such as councils, boards, or committees – may gain from demographic composition if they adopt methods of reducing the communication costs that come from group demographic composition.

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Table 1. Summary Statistics

Panel A: Cities	All	Final sample	
Population	218,036	255,980	
N	399	298	
Panel B: Councils	**All**	**Final sample**	
Num seats	7.67	8.85	
N	4,048	1,380	
Panel C: Candidates	**All**	**Modal race**	**Nonmodal race**
White	0.73	0.80	0.16
Black	0.14	0.09	0.43
Hispanic	0.11	0.08	0.33
Asian	0.02	0.02	0.09
Other	0	0	0.002
N	19,360	1,828	1,828

Table 2. Effect of Nonmodal Race Candidate Victory on Council Racial Demographic Composition

	Demographic composition 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	1,828	1,828	1,828	1,828

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 3. City Council Meeting Discussion Topics

	Label	Topic
Discussion topics	Public commentary	city, people, council, community, public, really, need, meeting, lot, look, mayor, give, day, member, call, back, great, business, first, question
	Budget	budget, fund, dollar, revenue, tax, million, increase, city, look, thousand, percent, rate, need, money, pay, hundred, question, cost, point, general
	Infrastructure	city, look, tree, council, yes, need, public, back, question, could, give, business, project, people, street, lot, number, plan, really, item
	Urban Development	city, really, look, people, hotel, lot, downtown, parking, use, building, unit, need, fire, plan, area, community, question, space, talk, council
Procedure topics	Infrastructure Legislation	motion, city, second, yes, item, property, approve, project, aye, street, question, council, public, ordinance, favor, number, discussion, resolution, bid, move
	Development Finance	city, housing, dollar, yes, township, public, tax, fund, council, thousand, hundred, program, redevelopment, item, second, agency, motion, project, question, million

Notes: These groups of words are topic outputs from a Latent Dirichlet Allocation model. The topics shown here are among the most prevalent across all city council meetings in the transcript sample. Labels are assigned based on topic contents, and separated by whether the topic represents discussion or procedure within a meeting. Only the 20 highest-weighted words for each topic group are shown here. A full list of all topics and labels (and the 20 highest-weighted words for each) is available in Appendix Table A2.

Table 4. Demographic Composition's Effect on City Council Deliberation

	Discussion Topics				Procedure Topics	
	Public commentary	Budget	Infrastructure	Urban development	Infrastructure legislation	Development finance
Mean	15.26	7.58	1.82	1.85	9.01	3.02
All councils	6.758* (2.932) 7,684	0.011 (1.049) 7,684	-0.154*** (0.049) 7,684	-0.151*** (0.050) 7,684	6.060** (2.593) 7,684	-0.848*** (0.325) 7,684
Small councils	9.727*** (3.817) 1,511	0.934 (1.478) 1,511	-0.120 (0.079) 1,511	-0.119 (0.083) 1,511	5.257* (3.110) 1,511	-0.197 (0.205) 1,511
Large councils	4.477 (4.857) 6,173	-1.585 (1.473) 6,173	-0.155* (0.078) 6,173	10.128*** (0.080) 6,173	8.397*** (3.025 6,173	-1.299*** (0.450) 6,173

Table 5. Examples of Negative Sentiment in City Council Meetings

State	City	Year	Sentence	Roberta Negativity Score
CA	West Covina	2021	“the police department failed to implement the homeless plan from 2018”	88.98
CA	West Covina	2019	“and im very disappointed”	91.20
IA	Waterloo	2019	“thats just absolutely not true”	90.88
CA	Glendale	2020	“because its a very brutal way to make brutal and unsophisticated way to make budget reductions”	90.20
AL	Mobile	2020	“i completely disagree”	67.10
SD	Sioux falls	2020	“thats wrong”	78.70
NJ	Jersey	2021	“its unacceptable”	86.05
NJ	Paterson	2022	“no one cares”	53.35
CA	Yuba	2018	“i say thats wrong”	67.66
CA	Glendale	2019	“councilman draiman often uses disparaging words against councilor critic in both the press and at city”	57.36
AZ	Phoenix	2023	“you shouldnt be throwing around words like felony like im an idiot”	87.90
CA	Downey	2021	“you jacka**es thats the reason why im going through this emotional distress with and the loss of enjoyment of life because of and no housing under your housing program”	95.6
CA	Downey	2022	“but youre a dumb idiot and a moron”	89.75
FL	Orlando	2019	“hes insane”	74.29

Table 6. Demographic Composition's Effect on Sentiment in City Council Meetings

	Share of Sentences		
	Negative	Positive	Neutral
Mean	0.059	0.136	0.805
Main estimate	0.039***	-0.017	-0.020*
	(0.006)	(0.011)	(0.012)
Small councils	0.077***	-0.043*	-0.016
	(0.019)	(0.021)	(0.021)
Large councils	0.016***	0.003	-0.017
	(0.005)	(0.011)	(0.013)
NMC is not incumbent	0.056***	-0.029**	-0.0154
	(0.008)	(0.013)	(0.014)
NMC is incumbent	-0.018***	0.090***	-0.068***
	(0.007)	(0.009)	(0.025)
Meeting early in term	0.034***	-0.012	-0.019
	(0.010)	(0.019)	(0.021)
Meeting late in term	0.035***	-0.019	-0.042**
	(0.008)	(0.016)	(0.020)
N	7,684	7,684	7,684

Figure 1. Racial Demographic Composition in City Councils Over Time

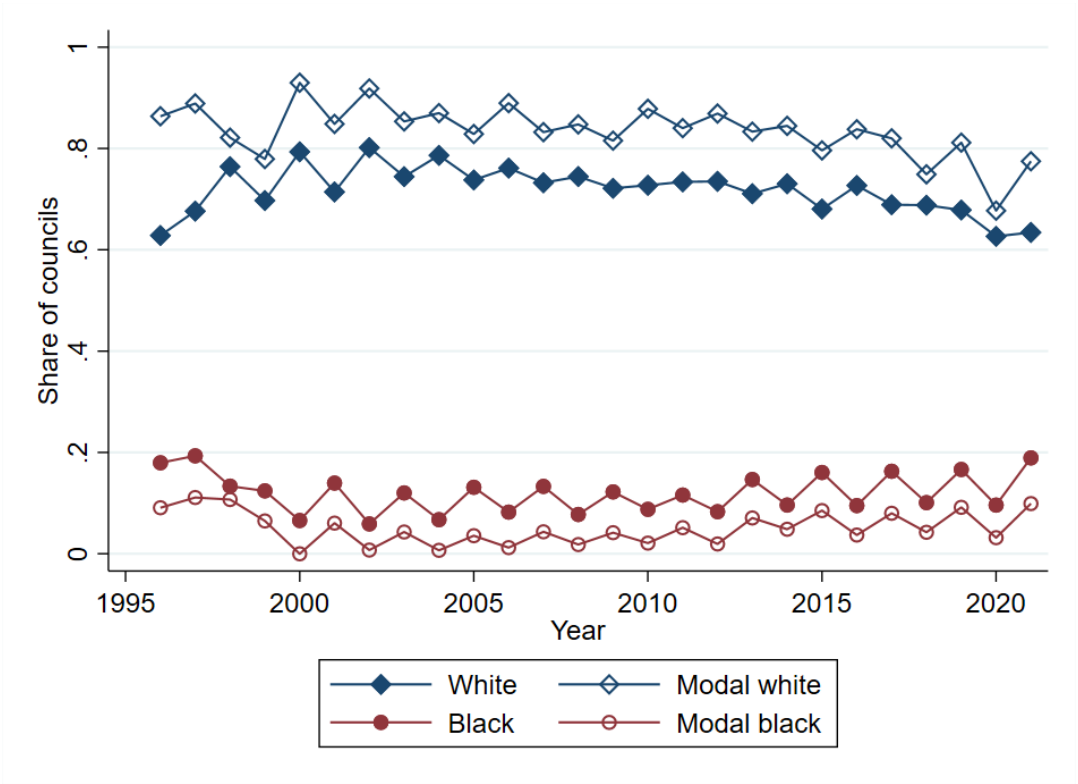


Figure 2. Probability of Victory for Nonmodal Race Candidates Near the Cutoff

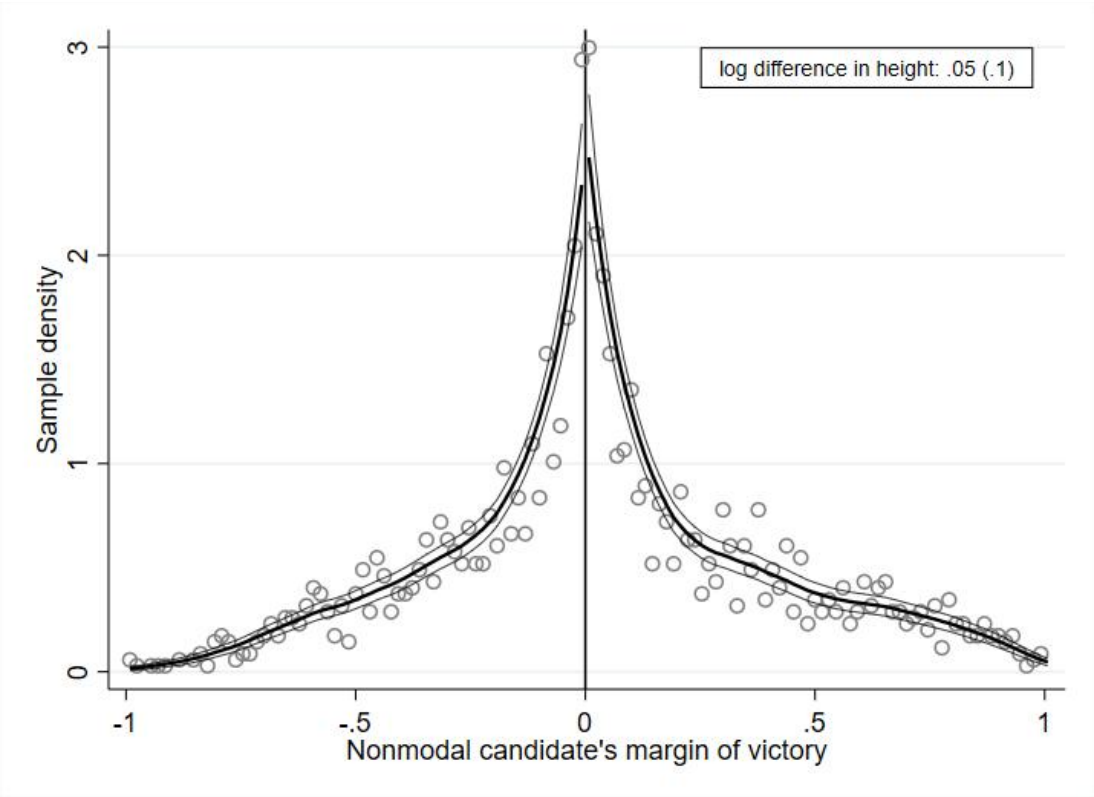
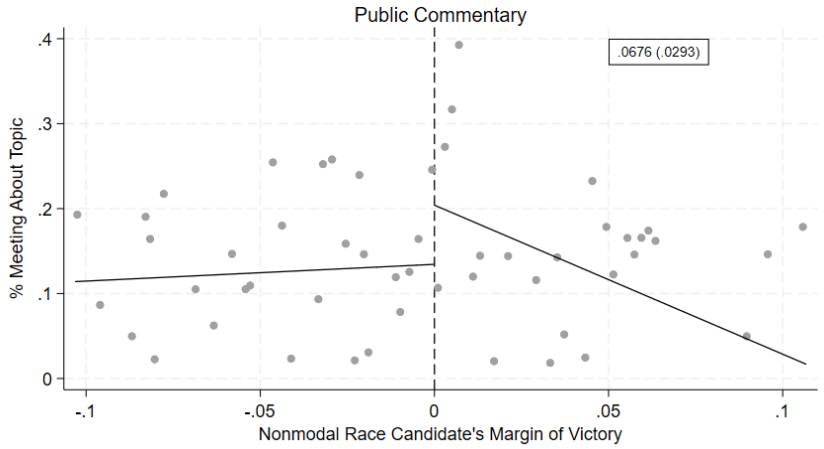
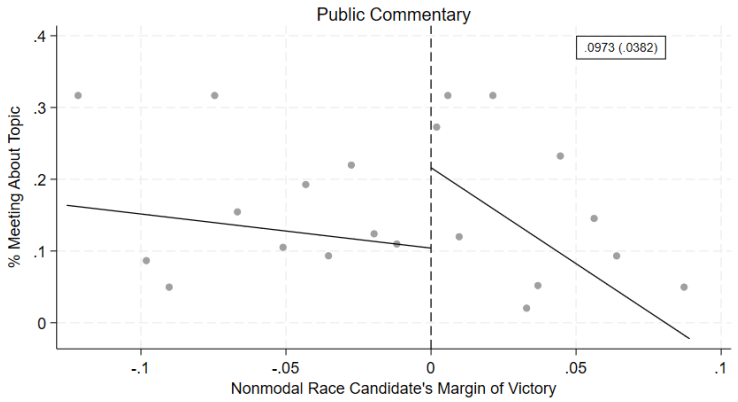


Figure 3. City Council Demographic Composition's Effect on Public Commentary Meeting Topic

a. All councils



b. Small councils



c. Large councils

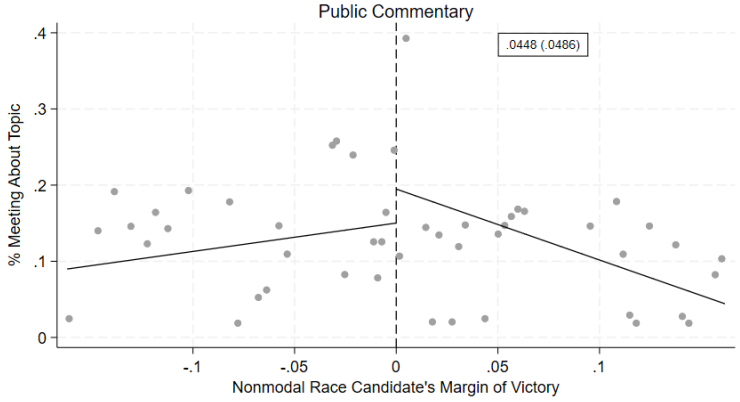
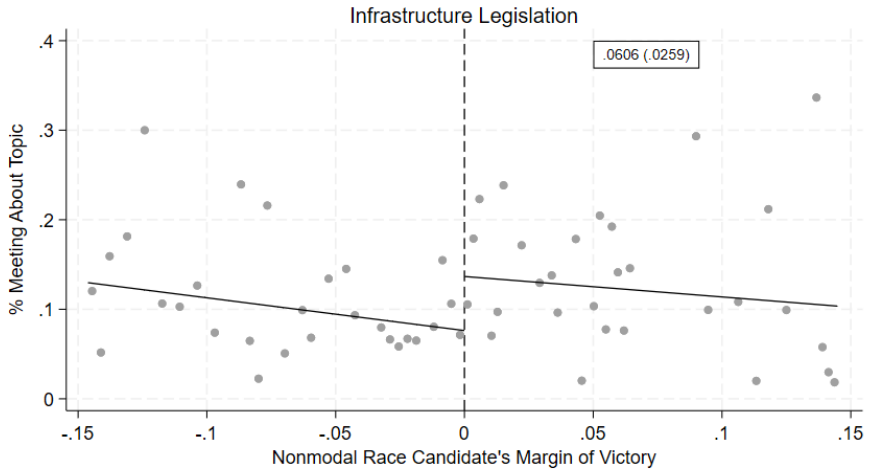
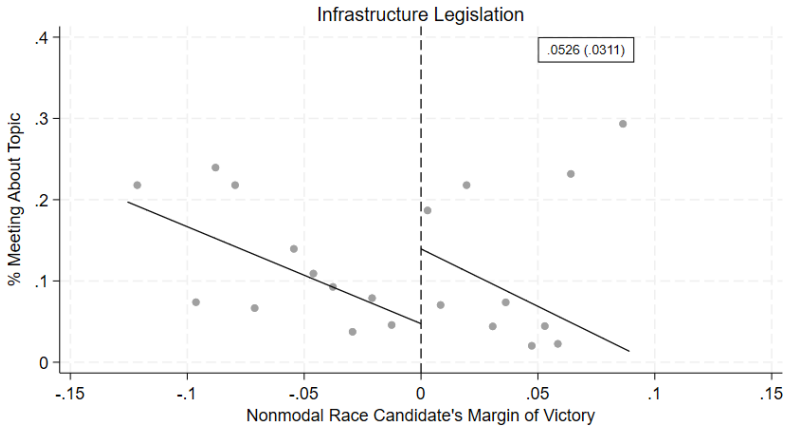


Figure 4. City Council Demographic Composition's Effect on Infrastructure Legislation Meeting Topic

a. All councils



b. Small councils



c. Large councils

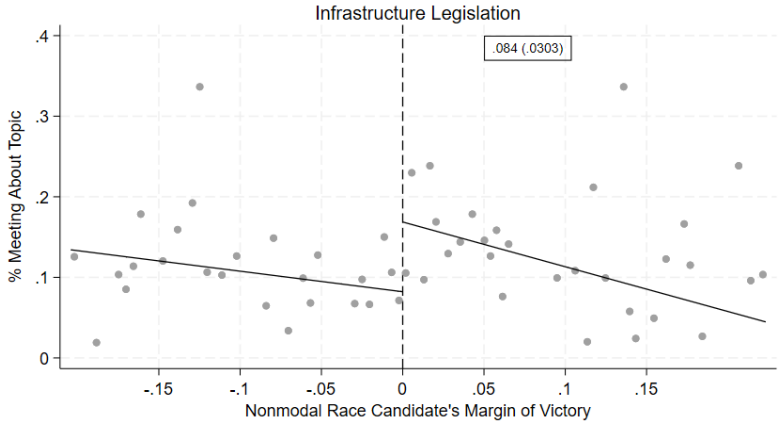


Figure 5. City Council Demographic Composition's Effect on Negative Sentiment in Council Meetings

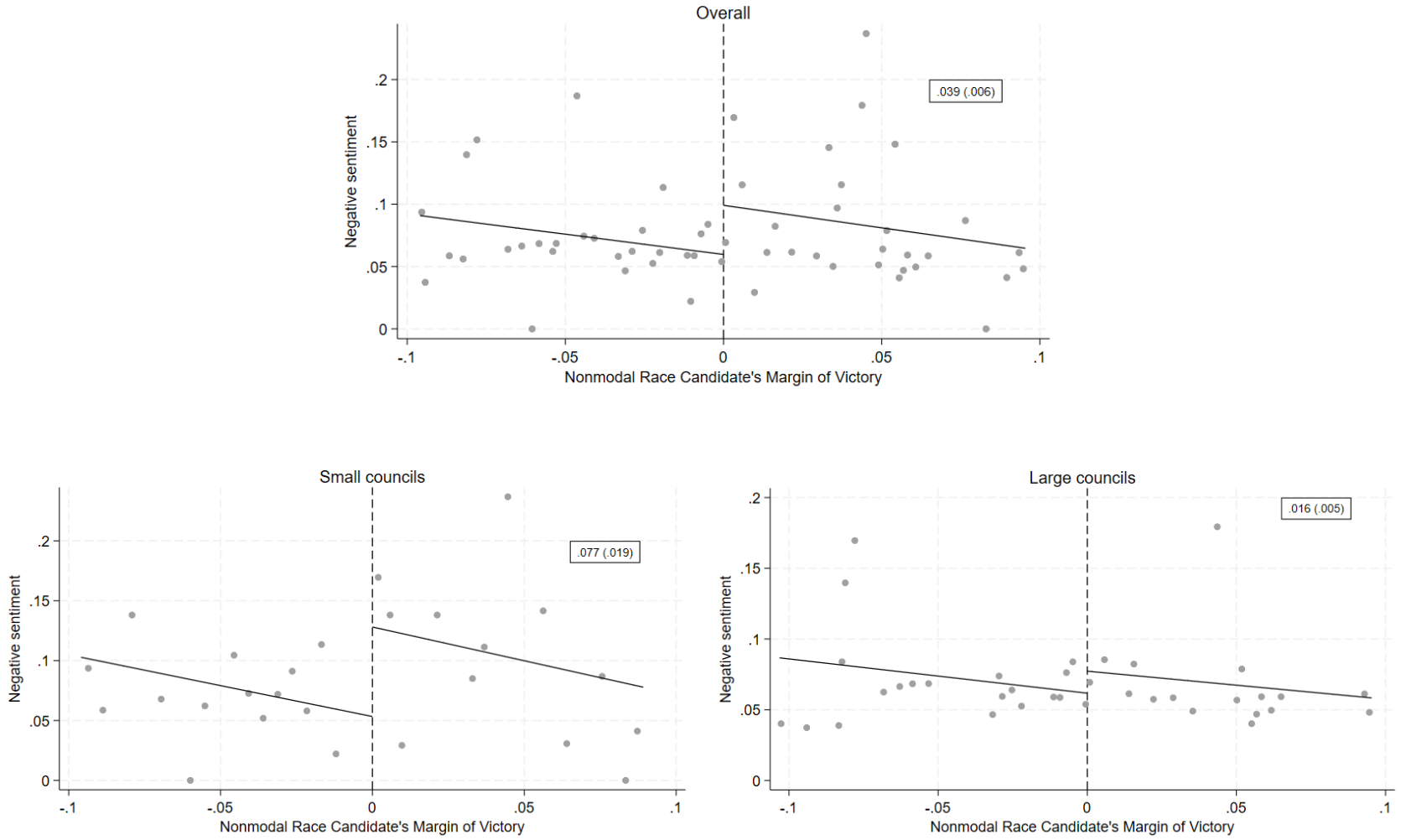
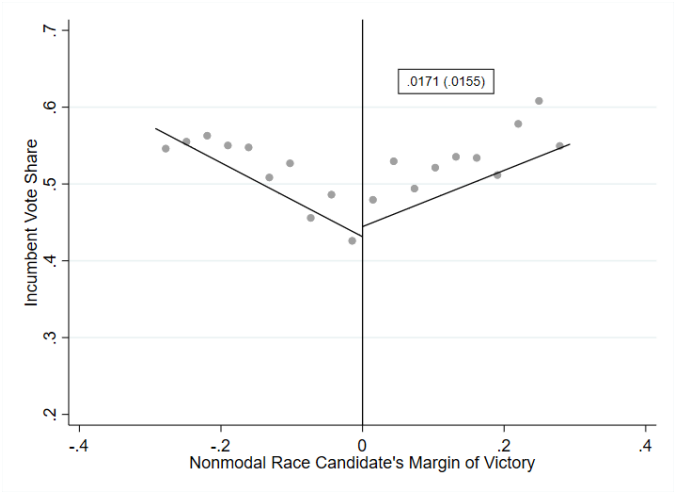
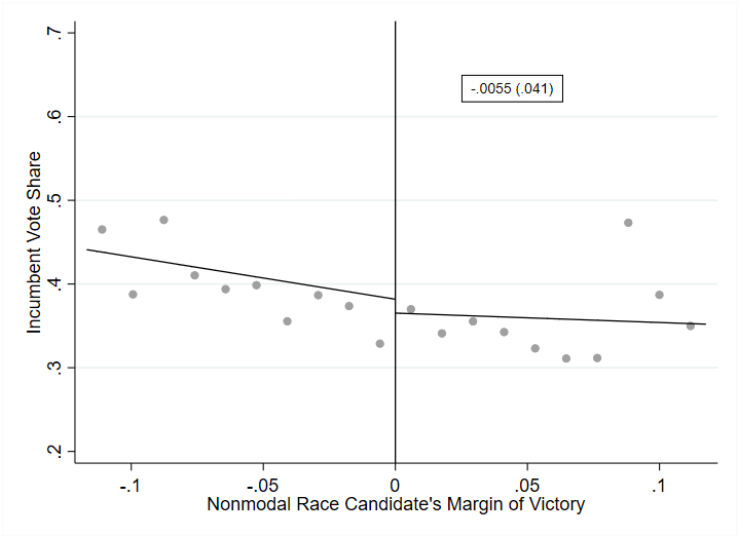


Figure 6. City Council Demographic Composition's Effect on Incumbent Vote Shares

a. Overall



b. Small councils



c. Large councils

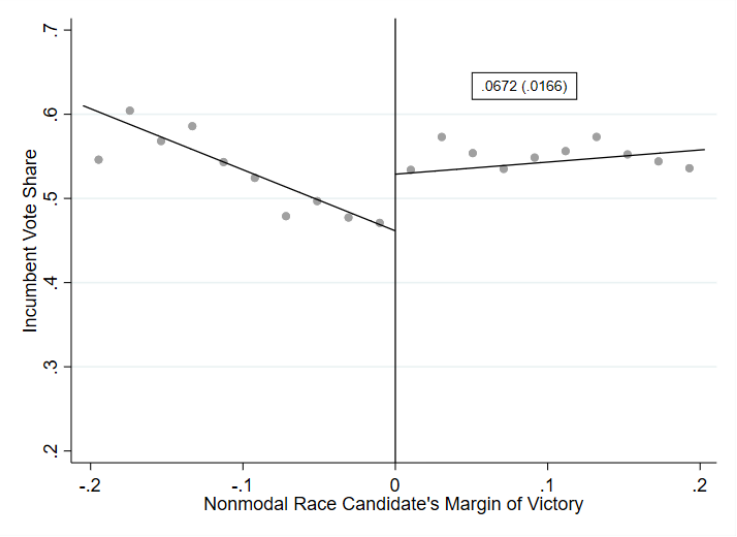
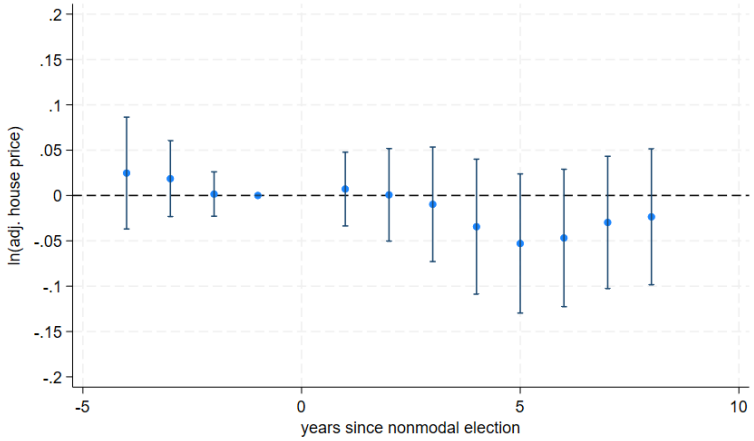
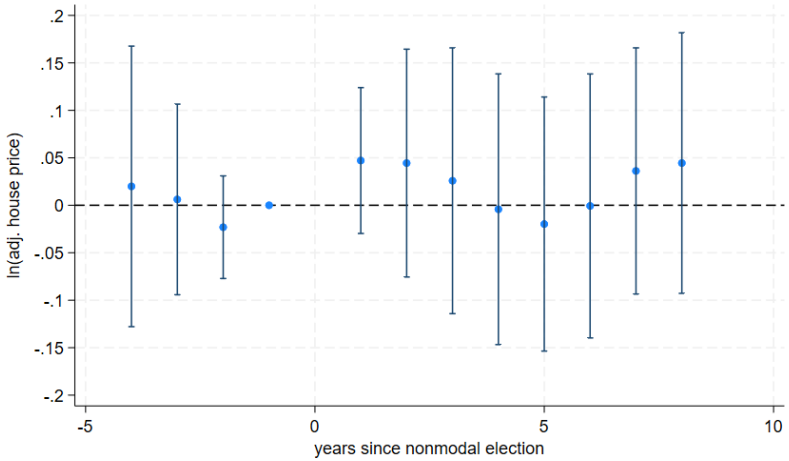


Figure 7. City Council Demographic Composition's Effect on Municipal House Prices

a. Overall



b. Small councils



c. Large councils

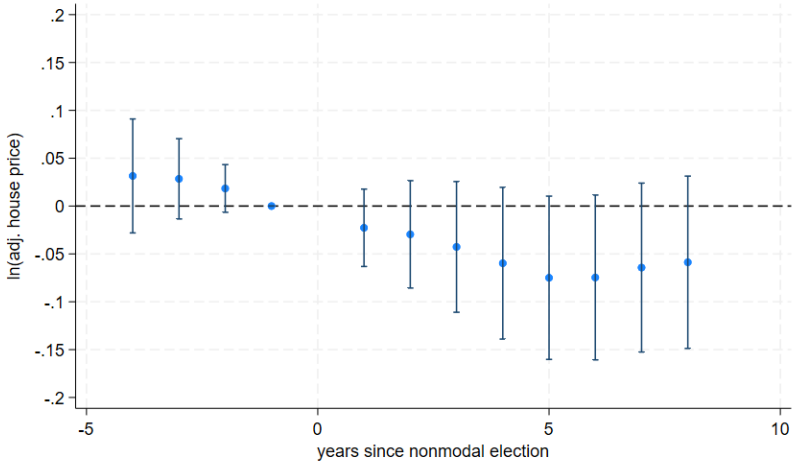


Table A.1 Continuity in Baseline Characteristics

	Variable	Mean	RD estimate	RD SE	RD p-value
Candidate characteristics	Female	0.306	-0.02446	0.087	0.779
	Democrat	0.713	0.051408	0.093	0.582
	Republican	0.183	0.037673	0.068	0.584
	Incumbent	0.265	0.059	0.073	0.433
Election characteristics	Total votes	20527	-4239	8513	0.618
City characteristics	Population	588636	184.21	64127.52	0.997
	% white	58.477	0.348	3.705	0.924
	% black	18.746	-1.770	2.913	0.543
	% asian	8.694	-0.671	3.089	0.827
	% hispanic	30.196	4.562	4.394	0.299
	Labor force participation	58.980	-0.557	0.998	0.576
	Median household income	53245.95	4633.66	4168.88	0.266

Table A.2 All City Council Meeting Discussion Topics

Label	Topic
Public Commentary	city, people, council, community, public, really, need, meeting, lot, look, mayor, give, day, member, call, back, great, business, first, question
Meeting Procedure	yes, motion, item, discussion, city, approve, second, please, consider, council, authority, dollar, call, regular, next, meeting, number, resolution, hundred, reconvene
Deliberation and General Discussion	yes, look, city, need, people, put, back, could, mean, lot, talk, question, something, na, gon, council, kind, really, motion, meeting
Community Projects	city, council, people, look, question, public, need, kind, community, could, move, project, use, back, meeting, talk, lot, put, item, ask
Infrastructure	city, look, tree, council, yes, need, public, back, question, could, give, business, project, people, street, lot, number, plan, really, item
Public Spaces	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
Infrastructure Legislation	motion, city, second, yes, item, property, approve, project, aye, street, question, council, public, ordinance, favor, number, discussion, resolution, bid, move
Housing and Land Use	plan, area, urban, land, city, housing, development, look, really, need, project, density, use, community, growth, people, corridor, process, lot, impact
City Services and Programs	city, sioux, look, fall, really, project, plan, community, need, question, council, service, people, talk, lot, staff, kind, process, program, system
Elections and Appointments	constitution, nomination, swear, council, election, motion, second, nominate, city, duty, discharge, mayor, clerk, yes, please, meeting, member, office, elect, appoint
Conversational	ah, yes, sun, day, let, wow, hello, today, oh, web, love, software, city, water, look, life, already, king, truth, nothing
General Council Business	city, meeting, yes, council, look, question, motion, people, need, public, give, dollar, back, really, could, ask, community, something, day, first
Commission Approvals and Hearings	motion, item, commissioner, county, second, sioux, yes, aye, number, unanimously, dakota, question, approve, public, hearing, comment, commission, pass, lien, morning
Legislative Procedure	substitute, defer, bill, number, motion, councilmember, amendment, council, city, committee, favor, second,

	meeting, vote, aye, public, properly, discussion, member, move
Urban Development	city, really, look, people, hotel, lot, downtown, parking, use, building, unit, need, fire, plan, area, community, question, space, talk, council
Parks and Facilities	project, look, park, building, really, space, lot, design, city, kind, area, parking, use, could, need, back, cost, talk, plan, people
Development Finance	city, housing, dollar, yes, township, public, tax, fund, council, thousand, hundred, program, redevelopment, item, second, agency, motion, project, question, million
Resolutions and Ordinances	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

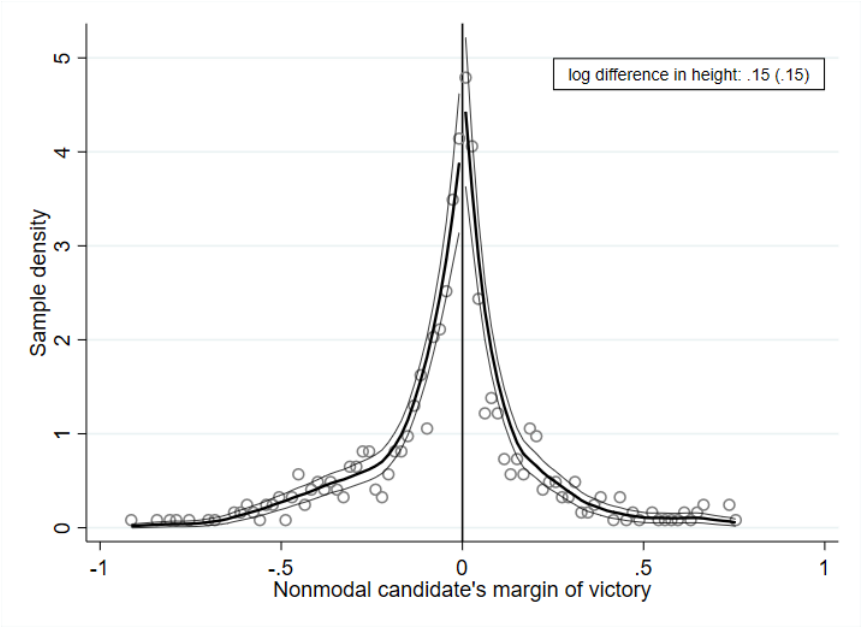
Notes: Only the 20 highest-weighted words for each topic group are shown here.

Table A.3 Bounding Effects Including Leavers

		Bounding Method	
	Main Estimate (Large councils)	Historical Average Vote Share (Large councils)	Heckman Selection (Large councils)
Nonmodal candidate victory	0.0672	0.0484	0.0769
	(0.0166)	(0.0119)	(0.0165)

Figure A2. Probability of Victory for Nonmodal Race Candidates Near the Cutoff

a. Small councils



b. Large councils

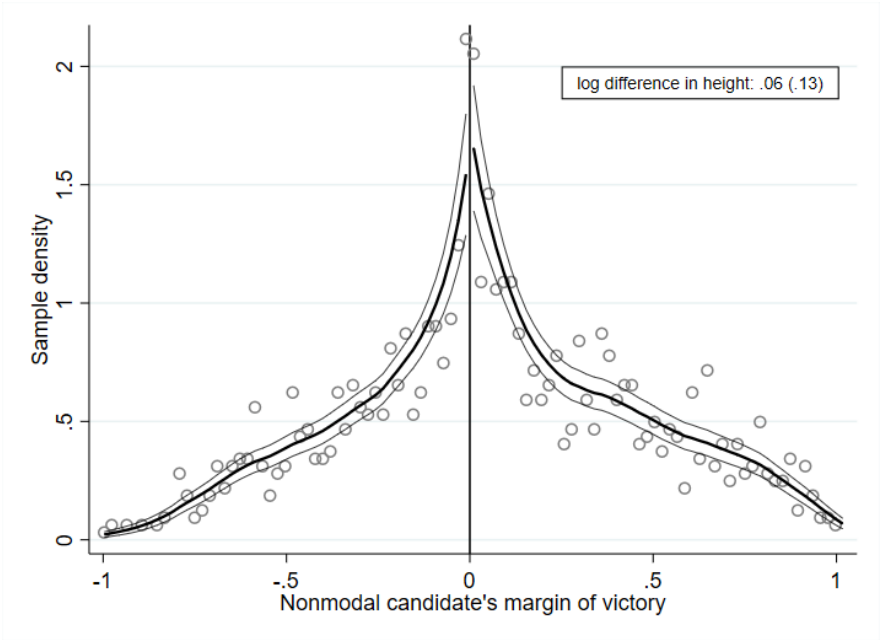


Figure A.3 Choice of Council Size Cutoff

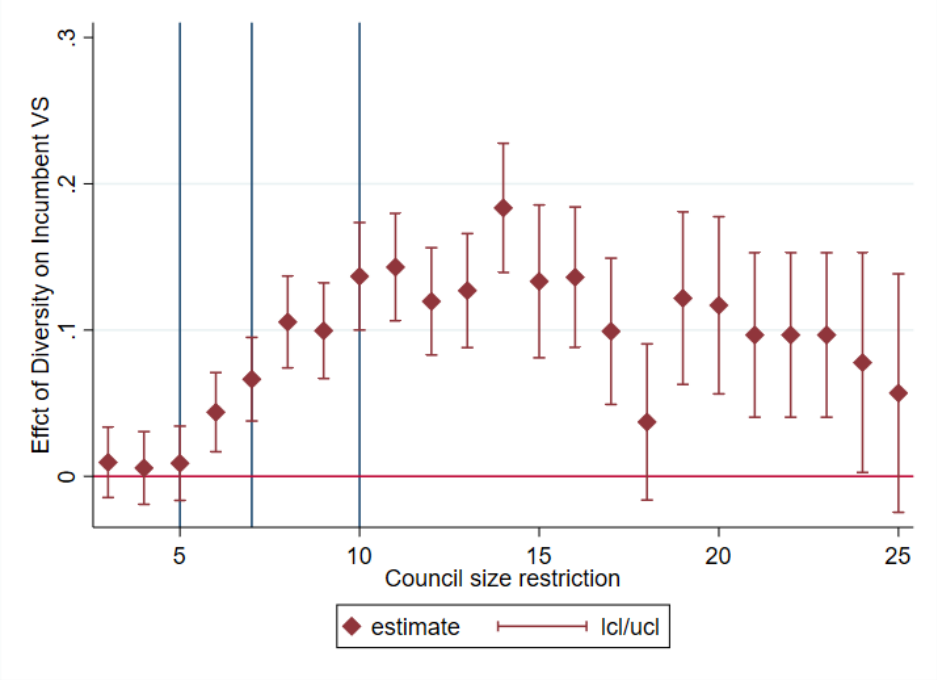


Figure A.4 RD Robustness to Bandwidth Choice (Incumbent vote share)

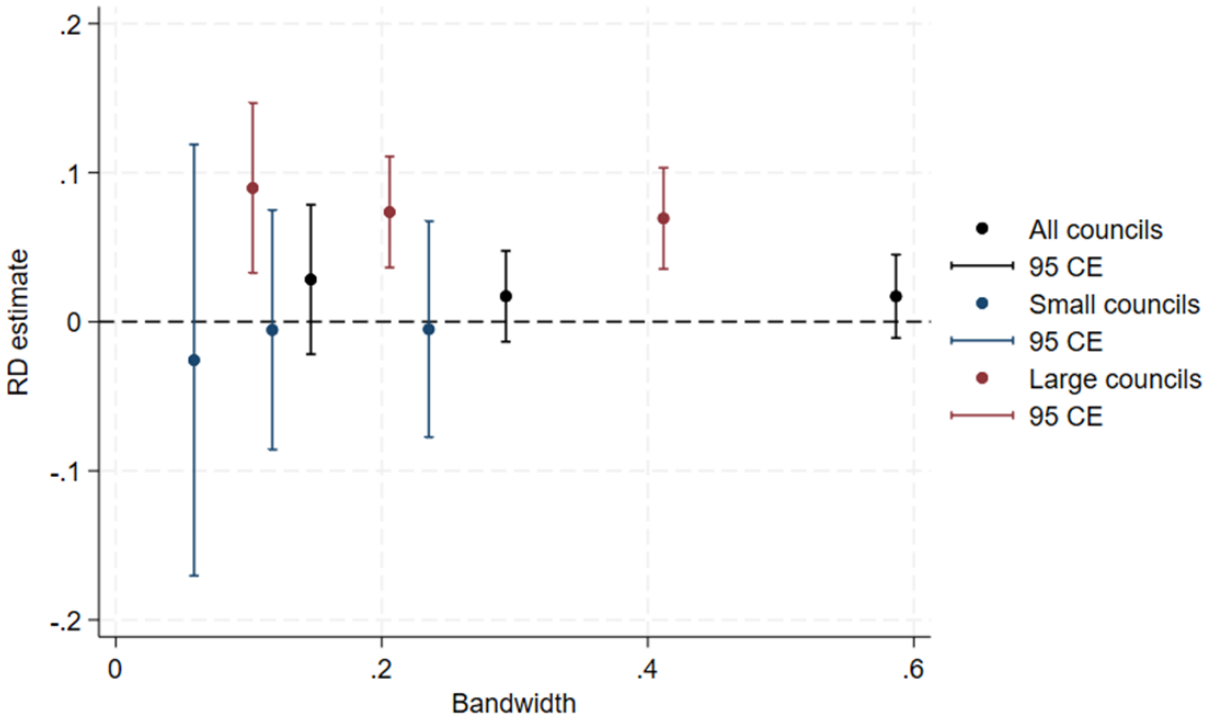


Figure A.5 Placebo Effects on Incumbent Vote Shares

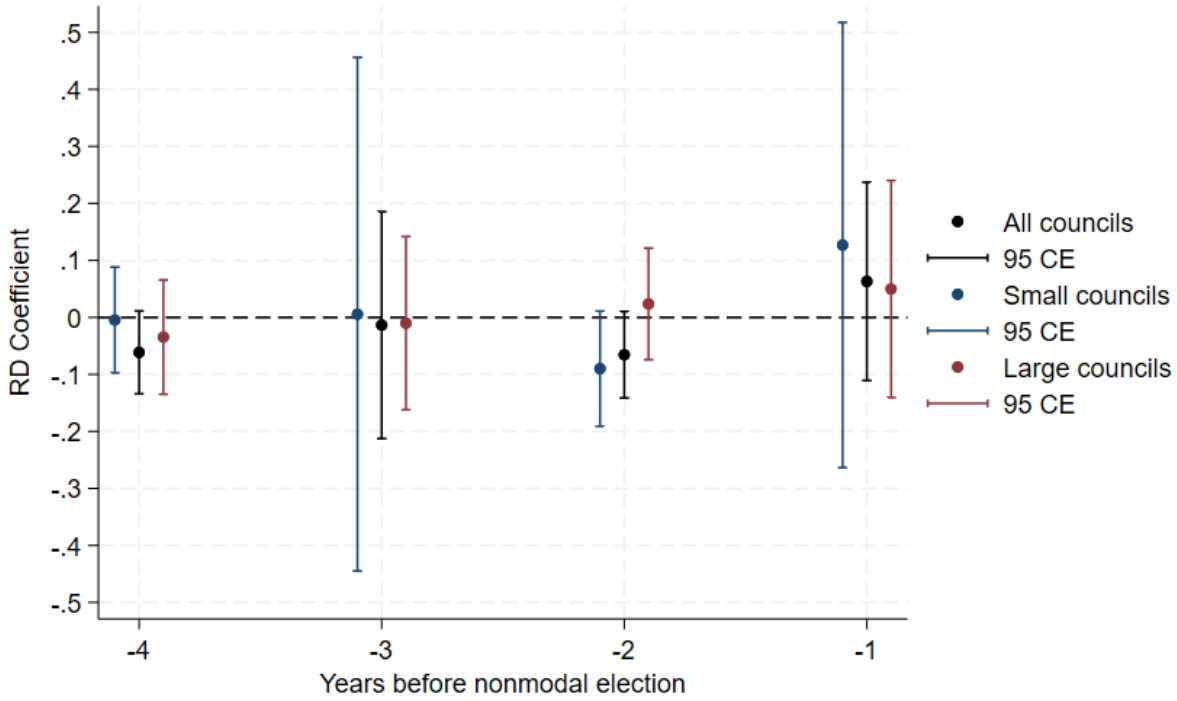


Figure A.6 City Council Demographic Composition's Effect on Municipal House Prices – no controls