Unifying the Demand-Side and Supply-Side Theories of Minority Descriptive Representation*

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Abstract

Under what conditions do racial minority candidates run for office? I present a theoretical model where minority candidates are assumed to decide whether they enter electoral contests based on the prior likelihood of winning and they make inferences on such likelihood of winning using the size of minority co-ethnic voters and past election returns as relevant heuristics. The proposed model improves our understanding of the causal mechanisms of minority candidate emergence and victory by directly tackling racial bias by white voters and minority candidates' self-selection into majority minority districts. I test my theoretical argument with data on non-partisan primary mayoral elections in Louisiana from 1986 to 2016. I find a remarkably close resemblance between my model's predictions via simulations and empirical results, which provides supportive evidence for my theoretical argument.

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1 Introduction

Under what conditions do racial minority candidates run for office? Understanding the causal mechanisms of minority candidate emergence and victory has been of great interest for scholars of minority representation, entailing critical normative and policy implications related to the Voting Rights Act (VRA) and redistricting. If minority candidates can only decide to enter and win electoral contests in majority minority districts with the plurality rule, the creation and maintenance of such districts will continue to be *the* solution to minority underrepresentation (Grofman, Handley and Niemi, 1992; Elmendorf, Quinn and Abrajano, 2016).

This article builds on the growing scholarship of the supply-side theory of minority descriptive representation, which contrasts its view of the lack of minority elected officials in the U.S. with the perspective of the demand-side theory of minority representation (Branton, 2009; Fraga, 2014; Shah, 2014; Juenke, 2014; Juenke and Shah, 2015, 2016; Fraga, Juenke and Shah, 2019). In the debate, the demand-side theory argues that minority candidates are unable to win enough votes to get elected outside of majority minority districts due to the presence of strong racial bias among white voters, and thus attributes the lack of minority officeholders to white voters who do not vote for minority candidates (Abosch, Barreto and Woods, 2007; Barreto, Segura and Woods, 2004; Trounstine and Valdini, 2008; Lublin et al., 2009). On the contrary, the supply-side theory states that minority candidates can actually perform as good as white candidates *once they run for office*. Indeed, recent research concludes that "the Latino descriptive representation gap, contrary to the voter-driven theories that place the onus primarily on the public, may instead be the result of strategic considerations of latent Latino candidates and party elites to the election" (Juenke and Shah, 2015, 9).

In this article, I demonstrate that both candidate and voter-driven theories are plausible and can be incorporated into a more unified framework of the rational minority candidate entry. Specifically, I present a theoretical model where minority candidates decide whether they enter electoral contests based on the prior likelihood of winning. These candidates make inferences on such likelihood of winning using the size of minority co-ethnic voters and past election returns as relevant heuristics for minority voting power and racially polarized voting, respectively. Importantly, the model suggests that the value of past election returns as a heuristic grows as the district becomes more racially balanced and thus competitive under the assumption of racially polarized voting. In contrast, the model also suggests that minority candidates' considerations depend less on past elections in majority minority or majority white districts since the amount of votes

they can receive are more easily inferred solely from the distribution of voters of different racial groups. By contending that the minority candidate supply is contingent upon the past voter demand, my proposed model demonstrates that minority descriptive representation is a function of *both* candidate considerations and voter choices (Bullock III and Johnson, 1985; Bullock III and Smith, 1990; Canon, 1999; Fraga, 2014).

My proposed model attempts to improve our understanding of the causal mechanisms of minority candidate emergence and victory by directly tackling unsolved issues with current scholarship. Consequently, the model provides a key to understand a set of cases the conventional approach cannot explain, such as the absence of minority candidates in majority minority districts and the presence of minority candidates in majority white districts (Juenke and Shah, 2016; Shah, 2017). First, it clarifies assumptions that supply-side theorists have implicitly established by explicitly formalizing them into the decision-making process of minority candidates. Second, it directly incorporates racial bias by white voters, which has been treated as a black box in the literature, both at the theoretical and empirical levels. Specifically, I argue that past election returns contain information about the level of cohesiveness of co-ethnic minority voters and racial bias by white voters (or racially polarized voting as combined). As a result, minority candidates learn how likely it is to win in particular districts given such information.

Third, my model fills the gap between the current supply-side arguments and the issue of minority candidates' self-selection into majority minority districts. While some researchers carefully deal with the self-selection problem as a potential source of bias in their analysis, I formally defend the perspective that "self-selection is not a problem" (Juenke and Shah, 2015, 11) and rather model minority candidate entry as a self-selection into districts with higher chances of winning. Moreover, the model generalizes the self-selection argument into both open races and non-open races by showing that the prior likelihood of winning can be calculated in the same way regardless of incumbency. Finally, the proposed model sheds new light on the importance of *both* time and types of districts, or what I call racial regime, when understanding the mechanisms of minority descriptive representation. By modeling these temporal and regime dimensions simultaneously, I demonstrate that we will be able to produce more precise predictions on when and where minority candidates run for office and secure their descriptive representation.

In the remains of this article, I will carefully describe my argument both formally and informally. I will then provide quantitative predictions on minority candidate emergence based on simulations, connecting my theoretical concepts of interest with relevant empirical measures. I will test my derived hypotheses with data on non-partisan primary mayoral elections in Louisiana from 1986 to 2016. I will also present the

robustness of my findings via placebo tests and different model specifications. I find a remarkably close resemblance between my model's predictions based on simulations and empirical results, which provides supportive evidence for my theoretical argument.

2 Voter-Demand and Candidate-Supply Theories of Minority Descriptive Representation

To explain the relative lack of minority descriptive representation, scholars have considered two competing theories, which are voter-demand and candidate-supply theories (Shah, 2014; Juenke and Shah, 2015, 2016). The demand-side theory sees the relative dearth of minority politicians as the minority candidate *defeat* problem. Here, minority candidates cannot win electoral contests outside of majority minority districts due to strong opposition from white voters (Abosch, Barreto and Woods, 2007; Lublin et al., 2009; Trounstine and Valdini, 2008). Thus, the relative lack of minority representatives is the result of white voters who do not vote for minority candidates. An important normative and policy implication of the voter demand theory is that creation and maintenance of majority minority districts is *the* solution to minority underrepresentation (Barreto, Segura and Woods, 2004; Bedoya, 2005; Casellas, 2010; Lublin, 1999; Lublin et al., 2009).

In contrast, more recent scholarship based on the supply-side theory describes minority underrepresentation as the minority candidate *retreat* problem. Here, minority candidates do not run for office outside of majority minority districts even though they have good chances of winning once they enter electoral competitions. Therefore, the lack of minority representatives is due to minority potential candidates' miscalculation of the odds of winning (Shah, 2014; Juenke, 2014; Juenke and Shah, 2015, 2016; Fraga, Juenke and Shah, 2019). One critical implication of the candidate supply theory is that minority underrepresentation can be partly solved by providing minority potential candidates a set of high quality information about electoral fortunes and voting behavior of the white electorate in their districts.

While each of the two competing theories may seem plausible, several unsolved problems remain. First, previous research has not explicitly modeled the decision-making of minority potential candidates. Additionally, most research has treated racial bias by white voters as a black box or a fixed phenomenon. In other words, the literature has recognized that white voters are less likely to vote for minority candidates, but it does not illustrate to what extent such racial bias is present in different elections and how minority candidates respond to varying degree of racial bias if any. Moreover, it is unclear what constitutes minority candidates'

self-selection into majority minority districts, which appears to be a key part of the candidate supply theory of minority representation. Finally, most research has not integrated different types of districts – or what I call *racial regime* – and temporal dimension in the discussion of minority descriptive representation. By racial regime, I refer to a different type of district defined by the racial composition such as majority minority, racially balanced, and majority white districts, which might influence minority candidates' strategies and calculation of the likelihood of winning. By temporal dimension, I describe a connection between current elections and past elections in terms of electoral performance of minority candidates relative to their white counterparts, which might also affect how minority candidates perceive their likelihood of winning. While the literature has acknowledged the importance of considering such aspects of minority representation, no single research has incorporated both factors in a coherent framework.[1]

In the next section, I describe my proposed model and illustrate how it unifies both voter-demand and candidate-supply theories of minority descriptive representation.

3 A Unified Model of Minority Candidate Emergence

In this section, I present a model of minority candidate emergence, elaborate and visualize observable implications from the model, and then draw two hypotheses that I test in later sections. Before introducing formal arguments, let me informally describe my theoretical argument about when and where minority candidates decide to run for office.

In the proposed model, I attempt to understand the district level minority candidate emergence as the decision making of the most viable minority politicians, whose sole agenda is to win elections where two racial groups (i.e., minority and majority groups) compete each other. Given these assumptions, I theorize that minority candidates decide to run for office when they see a higher probability of winning. Minority candidates then attempt to calculate the prior likelihood of winning in the upcoming elections, but as for any candidate, they are considered to be bounded rational and thus try to make the most satisfactory choice

[1] It must be noted that, separately, researchers have already taken up on the issue of racial regime and temporal dimension. For example, Juenke and Shah (2016) examine minority candidate emergence in white, racially mixed, and majority minority districts and report interactive effects of racial regimes, candidate race, and candidate partisanship. Shah (2017) also focuses on three "racial profiles" including majority white, majority minority, and multiracial cities and elaborates different power dynamics between racial groups in different types of cities. On the temporal dimension, Marschall, Ruhil and Shah (2010, 114-15) discuss that past success in minority electoral bits may influence minority candidate victory in later years, although they use the past representation variable as a control variable. Similarly, Shah (2014, 269, 271) considers the impact of any history of black candidacy on the current black minority emergence based on the theoretical insight that the initial hurdle to run for office as minority politicians is always the hardest in minority representation. Shah (2017) also studies how the changes in racial composition would affect minority electoral fortune and candidate supply.

based on incomplete information. Because it is quite difficult for minority candidates, as for any candidate, to calculate the prior likelihood of winning, they rely on two sources of information, which consist of (1) electoral performance of co-ethnic candidates in the last elections and (2) district racial composition as relevant heuristics. I then claim that the value of information from the last elections increases as districts become more competitive or more racially heterogeneous because the racial makeup is not as informative in racially balance districts as in racially homogeneous districts.

In the rest of this section, I formalize my argument and provide a quantitatively predictive logical model of minority candidate emergence.

3.1 Rational Model of Minority Candidate Entry

To consider when and where minority candidates emerge, I focus on the strategic entry of the most viable minority candidate in each electoral district. Below, I first introduce four assumptions and then describe the bounded rational model of minority candidate entry.

3.1.1 Assumptions

Assumption 1 (Biracial elections): Electoral competitions are held over two racial groups, majority and minority, and candidates' race is one of the most prominent factors which affect people's voting behavior based on the strong tendency of co-ethnic voting.

The first assumption states that I consider classic biracial elections where two racial groups compete each other and voters tend to support co-ethnic candidates.

Assumption 2 (Non-zero pool): There is always a non-zero number of minority politicians or potential candidates who could run if conditions allowed in each district.

This assumption excludes the possibility that I do not observe any minority candidate running for office due to the lack of the "supply" of minority potential candidates in the pool.[2]

[2]For studies looking at the potential-candidate pool, see Maisel and Stone (1997) and Fox and Lawless (2004).

Assumption 3 (Instrumental candidates): Minority candidates are short-term instrumental such that their primary goal is to get elected in elections.

This assumption rules out the possibility that minority candidates decide to run for office due to non-instrumental reasons such as symbolic reasons in which they seek to run for office to obtain benefits from the action of running itself (e.g., raising voice or selling names for future elections).

Assumption 4 (The most viable candidate): Whether I see at least one minority candidate or not solely depends on the strategic choice of the most viable minority politician in the candidate pool in the electoral district.

This assumption enables us to model the binary process of minority candidate emergence, which can be only observed at the district level, as the individual decision making by the most viable minority politician in the district. Assuming that minority candidate emergence is a Bernoulli process with success probability p, Assumption 4 states that

$$Y_{j,t} \equiv Y_{i,j,t} \sim \text{Bernoulli}(p),$$

where Y_j is a binary variable denoting if a district j has *any* minority candidate in an election at time t and $Y_{i,j,t}$ is a binary variable representing whether if the most viable minority candidate i in the district j decides to run for office in that election. Here, the notation for $Y_{i,j,t}$ may seem redundant. However, I define the most viable candidate as a set of candidates and their "teams" who perceive that they are the minority candidate with the highest likelihood of winning among co-ethnic politicians in the non-zero pool. While I consider the decision-making of minority candidates and their teams such as party stuff and strategists, I use the term minority "candidates" to suppress the complication.

Assumption 3 implies that when and where minority candidates are observed does not depend on the behavior of those candidates whose perceived odds of winning is not the highest among co-ethnic potential candidates. I believe this assumption to be plausible based on Assumption 3 that minority candidates are rational office-seeking actors and that less viable candidates would not decide to enter the electoral competition unless the most viable candidates do so.

In summary, Assumptions 1-4 claim that the district level minority candidate emergence can be modeled

as the decision making of the most viable minority politicians whose sole agenda is to win classical biracial elections. It should be emphasized that my theory does not consider a more general form (or two stages) of elections with primary and general elections (Stone and Maisel, 2003) and such extension must be explored in future research.

3.1.2 The Model

Based on these assumptions, I now consider the rational model of minority candidate entry. Following the literature of political ambition (Black, 1972; Lazarus, 2008; Aldrich, 1995; Jacobson and Kernell, 1983; Stone, Maisel and Maestas, 2004), I start from the following model of candidate entry:

$$u_{it} = \widehat{P}_{it} B_{it} - C_{it}, \tag{1}$$

where u_{it} is the utility that candidate i obtains from running for office at time t, $\widehat{P}_{it}$ is the candidate's estimate of the probability of winning if they enter the race, B_{it} is the benefits of holding the office, and C_{it} is the cost of running, which is greater than zero, at time t.[3] Black (1972) suggests that a rational office-seeking candidate enters the race if and only if $\widehat{P}_{it} B_{it} > C_{it} > 0$ and $u_{it} > u_{it}(A)$, where $u_{it}(A)$ expresses the benefit that the candidate receives when staying out.[4]

To simply the model, let me assume that $B_{it} = 1$ and $C_{it} = 0.5$ such that minority candidates decide to run when

$$\widehat{P}_{it} > 0.5 + \varepsilon_{it}, \tag{2}$$

where $\varepsilon_{it} \sim N(0, \sigma^2)$ represents an idiosyncratic error term for $u_{it}(A)$ and actual deviation of C_{it} from the assumption with $\sigma^2 > 0$. More precisely, I model minority candidate emergence (E_{it}) as

$$E_{it} = \mathbb{1}(\widehat{P}_{it} > 0.5 + \varepsilon_{it}), \tag{3}$$

where $\mathbb{1}$ takes 1 if the condition holds and 0 otherwise. Substantively, it implies that minority candidate emergence can be predicted by knowing about the prior likelihood of winning.

[3] In contrast to previous studies, I use the notation $\widehat{P}_{it}$ (as opposed to P_{it}) to make it clear that it is a candidate's estimate of the true winning probability.

[4] Lazarus (2008) discusses that $u_{it}(A)$ is usually very different for experienced politicians and amateurs, which affect the required level of $\widehat{P}_{it}$ in the model, but I do not distinguish the two types of politicians here.

How can (minority) candidates calculate $\widehat{P}_{it}$? I argue that the win probability is a function of what I call *racial electoral performance*. I define the concept as follows:

DEFINITION 1 (Racial Electoral Performance): *Racial electoral performance is the extent to which minority candidates safely secure their descriptive representation relative to their white counterparts.*

Now let us formalize this idea. To simply the argument, let us define African American voters as the minority group of interest and white voters as the majority group of reference. Let V_{it}^{B} and V_{it}^{W} denote the vote shares of the top black and top white candidates, respectively. If black candidates are fully rational with complete information, the probability of winning can be expressed as

$$P_{it} = \mathbb{1}(V_{it}^{B} - V_{it}^{W} > 0), \tag{4}$$

where $\mathbb{1}$ is an indicator function taking 1 if the specified condition inside the brackets is satisfied and 0 otherwise. In other words, the probability of winning an electoral contest is 1 if the top black candidate obtains more vote share (or one more vote) than the top white candidate and 0 if the condition does not meet. Here I assume that there is always a tie-breaker and do not consider the case where the two quantities are the exactly same. Hence, if such vote shares are *ex ante* known, the win probability is a deterministic quantity, and the rational minority candidate decides to and not to run for office with certainty.

Although this makes sense on the logical ground, it is usually impossible for any candidate to diagnose the above condition with no measurement error due to the cognitive burden, lack of enough information, and time restriction in decision making. Thus, I instead rely on the concept of bounded rationality (Jones, 1999) and argue that the win probability can be calculated based on an educated guess about the corresponding vote shares. I then assume the following win probability:

$$\widehat{P}_{it} = \mathbf{F}\left(\frac{\widehat{V}_{it}^{B} - \widehat{V}_{it}^{W}}{2}\right), \tag{5}$$

where the hat symbols imply that these vote shares are speculated quantities as opposed to known measurements. Here, $\mathbf{F}$ represents a cumulative distribution function (CDF) of any elliptical distribution (e.g., normal and t-distributions) with some mean and a finite variance and I use it for conceptual convenience (i.e., it is a monotonic function bounded by 0 and 1 and symmetric around the mean). One example of $\mathbf{F}$ is a CDF

of a normal distribution with mean 0 and standard deviation 15, which maps the values between about -50 and 50 onto the probabilistic scale (i.e., numbers between 0 and 1). Here, the standard deviation controls the degree of non-zero probability that is assigned to values which are far away from the mean. *Substantively, it represents how much candidates would allow for the possibility of miscalculating the relative advantages of vote shares*. Note that this quantity has a scaling constant $\left(\frac{1}{2}\right)$ in order to link the theoretical and empirical quantities of interest as discussed in Section 4. It should be noted that scaling does not change any result in my theoretical argument.[5]

I then theorize that in order for black candidates, as for any candidates, to speculate the difference in vote shares they rely on two different information sources, which are (1) district-level racial makeup and (2) racial electoral performance in the last elections. First, the district racial composition is informative because it can be directly translated to the expected difference in vote shares under the assumption of perfect co-ethnic voting. For example, if a black candidate is running against a white candidate in a district with 60% black and 40% white voters, the speculated vote share will become 60% and 40% for the black and white candidates, respectively, and the "best guess" for the difference in vote shares becomes 20% points, under the perfect co-ethnic voting assumption. Second, racial electoral performance in the last election is instructive since it tells about how much black candidates can solicit crossover votes from white voters, while reserving co-ethnic votes from black voters, if the political climate remains the same from the last election.

Here, I am not claiming that black candidates choose either information as a heuristic to calculate the win probability. Rather, the two information are assumed to be complementary, and I theorize that the relative importance of the two heuristics depends on the types of districts from which minority candidates are running. I argue that the district racial composition is quite informative when districts are more racially homogeneous. In this situation, the information from the last elections is less relevant because the racial distribution seems to dominate upcoming electoral results anyway.

On the contrary, when districts are more racially balanced the best guess based on racial makeup is less informative because the best guess becomes closer to zero. For example, if a black candidate is running from a district with 51% black and 49% white voters the speculated vote share difference will be substantially small (i.e., 2% points) and the resulting win probability becomes closer to a coin flip. Under this scenario,

[5]My substantive argument does not change regardless of scaling as long as the function **F** has an appropriate tuning parameter as discussed below.

the information from the last elections becomes a more useful marker to calculate the relative advantage of any black candidate to any white candidate (e.g., Chances are 50-50 based on the racial composition, but a black candidate won with a great margin relative to her white opponent last time. Thus, I speculate that the prior probability of winning is higher than 0.5). More generally, I conjecture that black candidates put more weight on the information from the last elections in racially balanced districts than in racially homogeneous districts. To formalize the idea that I just described, I introduce the following model:

$$\widehat{P}_{it} = \mathbf{F}\Bigg(\underbrace{\alpha_{it}\left[\frac{V^{B}_{it-1} - V^{W}_{it-1}}{2}\right]}_{\text{Last elections}} + \underbrace{\left[1-\alpha_{it}\right]\beta_{it}}_{\text{Racial composition}} \Bigg) \tag{6}$$

Here, V^{B}_{it-1} and V^{W}_{it-1} express the vote share of the top black candidate and white candidate in the last election (i.e., at time $t-1$) and they are known quantities. α_{it} is a relative weight parameter on the past information and β_{it} denotes a speculated marginal vote share given the district racial composition and the assumption that voters always support co-ethnic candidates. Both parameters are functions of the proportion of black voters λ_{it} and defined as $\alpha_{it} = 4\lambda_{it}(1-\lambda_{it})$ and $\beta_{it} = 50(2\lambda_{it}-1)$, where $\alpha_{it} \in [0,1]$ and $\beta_{it} \in [-50, 50]$, respectively. To illustrate how these parameters behave, Figure 1 plots each parameter against the proportion of blacks, demonstrating that the relative weight parameter gets maximized when 50% of districts are black, whereas the speculated vote share parameter linearly increases as a function of the size of black voters. Since the racial electoral performance term only takes values between -50 and 50, the argument of the CDF will take values between -50 and 50.

3.1.3 Observable Implications

To illustrate the model, let us provide a simple numerical example. Suppose that I observe that the top black candidate and top white candidate obtained 50% and 40% of vote shares, respectively, in the last election in a district with 65% black voters and 35% white voters. Thus I have $V^{B}_{it-1} = 50$, $V^{W}_{it-1} = 40$, and $\lambda_i = 0.65$. Using these quantities, I can directly derive other parameters as $\alpha_{it} = 4 * 0.65 * (1-0.65) = 0.91$ and $\beta_{it} = 50 * (2 * 0.65 - 1) = 15$. Substantively, this means that the hypothetical black candidate mostly relies on the information coming from the last election relative to the speculated vote share difference based on the racial composition to calculate the probability of winning in the hypothetical district. To combine these results, I obtain $\widehat{P}_{it} = \mathbf{F}(0.91 * 5 + 0.09 * 15) = \mathbf{F}(5.9)$. For the conceptual convenience, let us assume

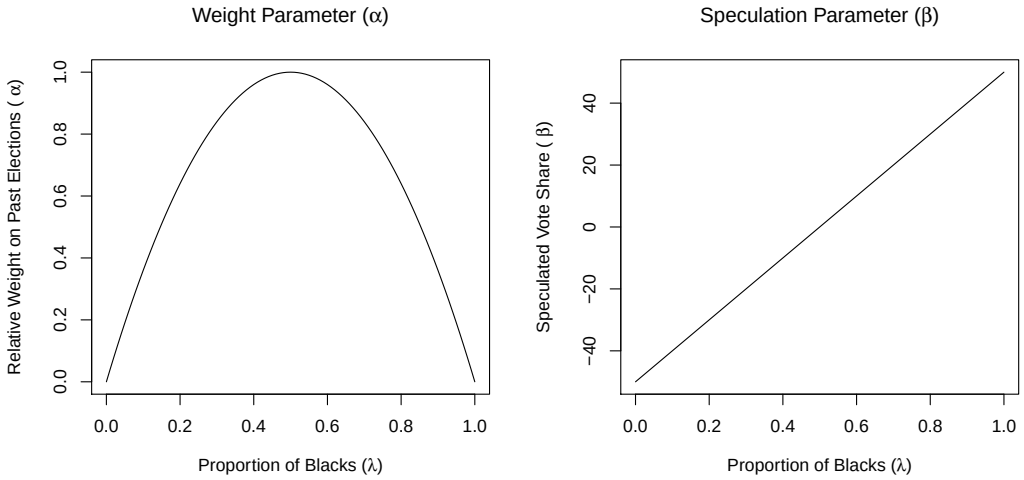

Figure 1: **Model Parameters**
Note: The two plots illustrate the behaviors of the two parameters in the proposed model. They portray that the relative weight parameter gets maximized when 50% of districts are black, whereas the speculated vote share parameter linearly increases as a function of the size of black voters.

that **F** is a normal CDF with mean 0 and standard deviation 15. I choose this specification for **F** because the argument of the function (i.e., weighted average of the vote share difference) ranges from -50 to 50 and this logical range nicely fits the property of this normal CDF. As a result, I obtain $\widehat{P}_{it} = \Phi_{0,15}(5.9) \approx 0.65$ or there is a 65% chance that any black candidate could win an election in the given district.

Note that the model suggests that the black candidate as a decision maker puts more weight (i.e., larger α_{it}) on the information from the last election (i.e., V^B_{it-1} and V^W_{it-1}) as the district becomes more racially balanced (i.e., λ_{it} gets closer to 0.5). I state this observation as a proposition.

Proposition 1. (Racial regime) *The significance of past information increases as two racial groups become more equally distributed.*

- If $\lambda_{it} \to 1$ (perfectly black districts), $\widehat{P}_{it} = \mathbf{F}(\beta_{it})$
- If $\lambda_{it} \to 0$ (perfectly white districts), $\widehat{P}_{it} = \mathbf{F}(\beta_{it})$
- If $\lambda_{it} \to 0.5$ (racially perfectly balanced districts), $\widehat{P}_{it} = \mathbf{F}\Big(\frac{V^B_{it-1} - V^W_{it-1}}{2}\Big)$

To facilitate the above proposition more intuitively, I present my simulated results of the model. Figure 2 visualizes how $\widehat{P}_{it}$ changes as the vote share difference at time $t-1$ increases from its minimum to

maximum values and how the function behaves differently according to the proportion of black voters. Here I use different location and scale parameters for the cumulative distribution function in the model to show that my theoretical expectation is robust to varying tuning parameters. Notice that when districts are racially homogeneous to a great extent (e.g., $\lambda = 0.1$ or $\lambda = 0.9$), the information from the last election has little effect on the prior win probability. Indeed, the win probability does not *increase* in predominantly white districts unless the top black candidates "did extremely well" relative to their white opponents in the last elections, whereas the win probability does not *decrease* in predominantly black districts unless the top black candidate "did extremely poorly" relative to their white counterparts in the last elections. In contrast, in racially more balanced districts (e.g., $\lambda = 0.5$) the past electoral performance greatly affects the prior win probability.

Thus, the model I propose predicts that what happened in the past affects what would happen in next and how the strength of the linkage between past and present varies by racial regimes. It must be emphasized that my proposed model is more informative than informal conceptual maps in previous research since ours can predict not only whether there is any expected positive effect (i.e., directional prediction) but also how such effect appears (i.e., quantitative prediction) (Taagepera, 2008; Shugart and Taagepera, 2017). From the model, I now draw the following observable implications as hypotheses.

Hypothesis 1: We are more likely to observe minority candidates in districts where the electoral performance of minority candidates in the last elections was high.

Hypothesis 2: The impact of the past performance of minority candidate is greater in racially balanced districts than in majority white and majority black districts.

4 Data and Measurement

4.1 Non-Partisan Primary Elections Data

To test the two hypothesis, I rely on candidate-level data of mayoral elections in 313 Louisiana municipalities from 1986 to 2018.[6] Louisiana mayoral elections provide a great test case for my hypotheses because they

[6]This data set is collected as a part of the Local Elections in America Project (LEAP) (Marschall and Shah, 2013) between 2016 and 2017.

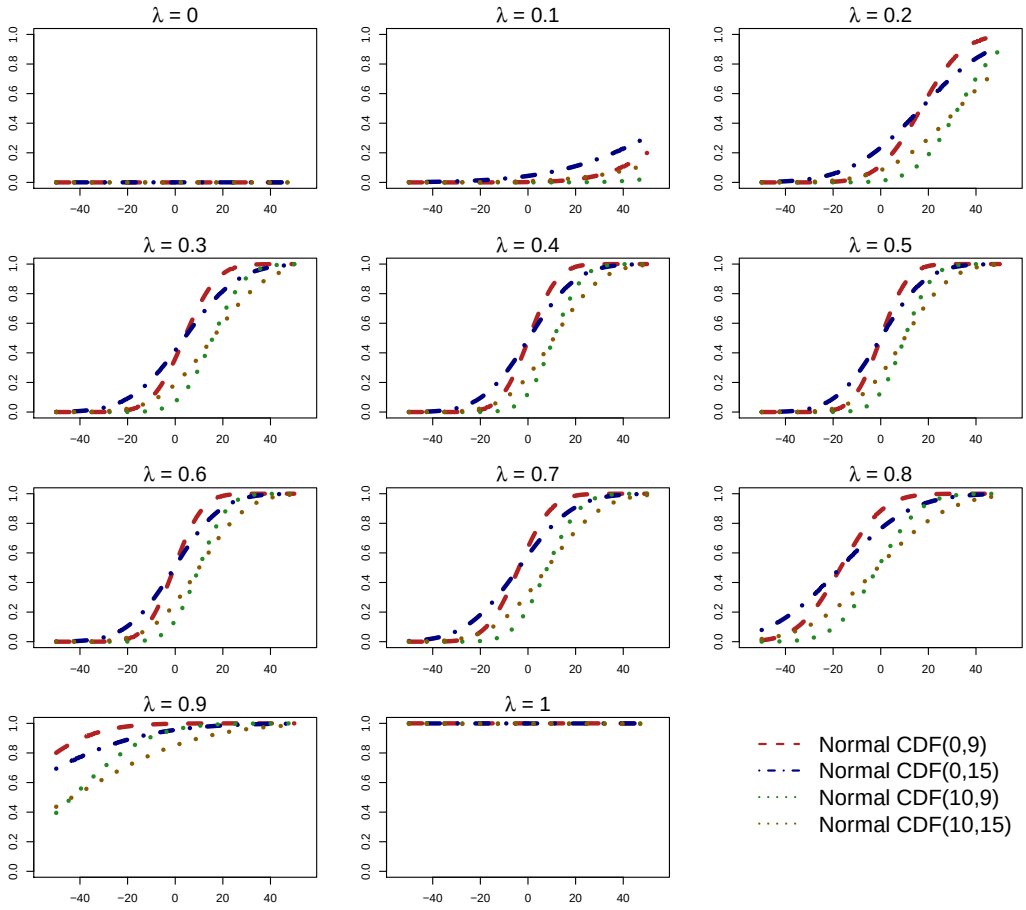

Figure 2: **Visualization of the Model Predicting the Probability of Minority Candidate Emergence** *Note*: This figure visualizes how racial electoral performance at time $t-1$ predicts the win probability and how the results change according to the district racial composition. To calculate the probability, I use multiple cumulative distribution functions for $\mathbf{F}$ including $\Phi(0, 9)$, $\Phi(0, 15)$, $\Phi(10, 9)$, and $\Phi(10, 15)$. Regardless of the choice of $\mathbf{F}$, this figure shows that racial electoral performance at time $t-1$ has the biggest effect when districts are more racially balanced.

use a unique electoral system called the majority run-off system, overcoming a potential problem of using general election data to study minority candidate emergence. In general elections, the absence of minority candidates stems from two possibilities including that no minority candidate decided to run for office and that minority candidates ran but lost in primary elections, although previous research using general election data does not empirically differential the two potential mechanisms (Juenke, 2014; Juenke and Shah, 2015, 2016; Fraga, Juenke and Shah, 2019). In contrast, in the majority run-off system, all candidates participate in open-primary elections regardless of partisan affiliation and the candidate with the majority votes becomes a winner (Keele et al., 2017).[7] This enables us to eliminate the second possibility of the absence of minority

[7]When no candidate obtains the majority votes, then, the top two candidates compete each other in a run-off election.

candidate and make inferences about the supply of minority candidates as the direct consequence of minority candidates' decision to run for office.

Louisiana elections also serve as a great benchmark for my theoretical model since more than 96% of voters are either African American or white according to the official registration records with self-reported race (see Appendix B). The data also contains vote totals for all 5297 candidates in 2037 elections. Moreover, I compiled information about candidates' race based on internet and news article search and thus presents a unique opportunity to examine minority candidacy with more accuracy than other race imputation or inference methods (Shah and Davis, 2017).

One of my goals is to examine whether the impact of racial electoral performance varies according to the proportion of black voters (Hypothesis 2). I do this by categorizing all districts into three types of racial regime, including majority white districts, racially balanced districts, and majority black districts, based on the average proportion of black voting-age population over the sample years. Here, I employ cutoff points of 40% and 65%, respectively, the latter of which is based on empirical and legal arguments about majority minority districts (Cameron, Epstein and O'halloran, 1996). While the first cutoff point is rather arbitrary, I performed robustness checks to confirm that my results do not depend on the marginal changes in the cutoff points. Among 2037 elections, 63.5% are from majority white districts, 25.6% are from racially balanced districts, and 11.4% are from majority minority districts, respectively. I also demonstrate that very few districts experience drastic demographic changes so that my racial regime coding may be jeopardized (see Appendix D).

The outcome variable of interest is a binary variable denoting whether an election features any black candidate. One or more black candidates appear in about 6% of elections in majority white districts, 45.7% of races in racially balanced districts, and 94.2% of contests in majority minority districts. Figure 3 displays the distribution of the outcome variable across districts over time.

4.2 Measuring Racial Electoral Performance

The independent variable of interest is a continuous variable representing racial electoral performance discussed in Section 3. When I introduced the difference in vote shares between the top black candidate and top white candidate in the model, I did not provide any theoretical and empirical justification for the metric. Here, I discuss the measurement of racial electoral performance by demonstrating that the quantity is rooted in the well-known concept of the margin of victory and operates as a powerful glue that links

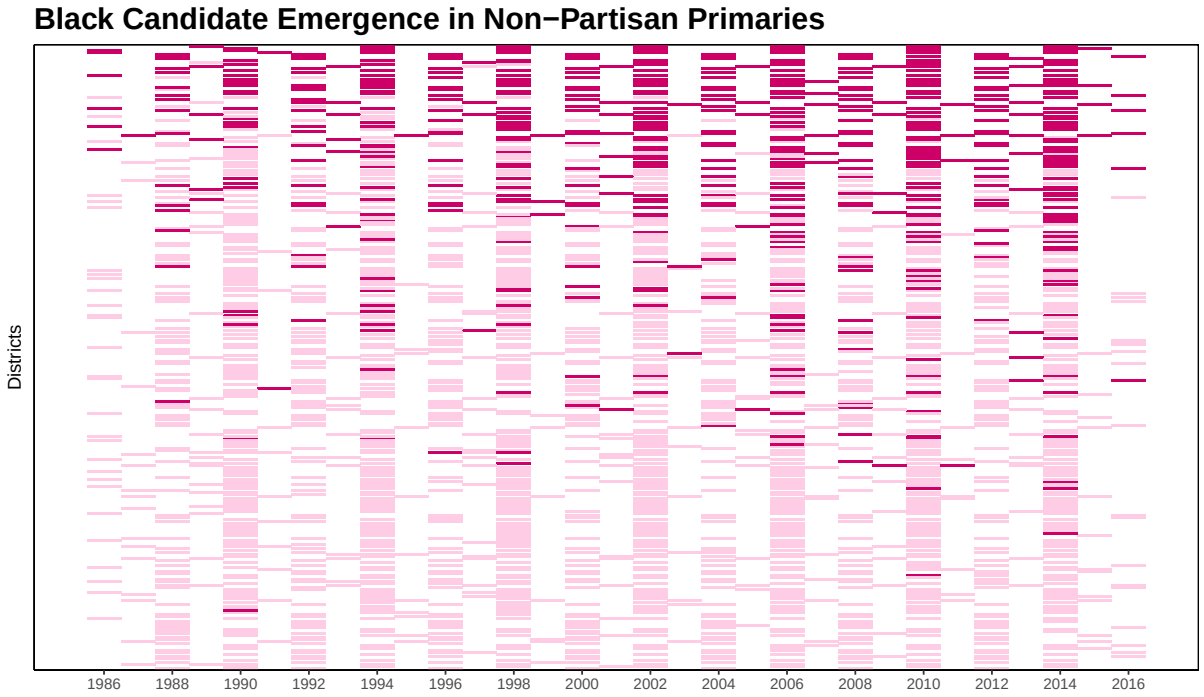

Figure 3: **Distribution of the Outcome Variable across Districts over Time**
Note: This figure portrays the distribution of the outcome variable in 303 districts from 1986 to 2016. The dark areas represent elections with one or more black candidates and the light areas indicate elections without any black candidate. The districts are ordered by the average proportion of black voting-age population in the entire time period from the highest (top) to the lowest (bottom).

my theoretical argument and empirical analysis. Specifically, I measure racial electoral performance as a signed racial margin of victory. First, let us introduce the concept of the general margin of victory as follows:

DEFINITION 2 (General Margin of Victory): *The general margin of victory is the minimum number of vote shares that have to be modified in order to change the outcome (i.e., winner) of an election.*[8]

In first-past-the-post (FPTP) elections, the margin of victory is computed as half the difference in votes between the winner and the runner-up. For example, when I have a winner who received 60% of ballots and a runner-up who obtained 40% of ballots, the general margin of victory is $\frac{1}{2} * (60 - 40) = 10$. Thus, if I remove 10% of ballots from the winner and allocate them to the runner-up, the election will be a tie (50% ballots vs. 50% ballots) and thus change the outcome of the election. To compute the "tie-free" margin, I

[8]The more accurate definition of the general margin of victory considers the minimum number of ballots instead of vote shares. **Add justification.**

simply add 1 to the above number (Xia, 2012; Magrino et al., 2011), while I assume that there is always a tie breaker in my argument as discussed above.

Based on this definition, I then introduce the concept of the "racial" margin of victory as follows:

DEFINITION 3 (Racial Margin of Victory): *The racial margin of victory is the minimum number of vote shares that have to be modified in order to change the race of the winner of an election.*

While the above definition is more general and can be extended to multiracial cases, I assume biracial elections with black and white voters according to Assumption 1. In first-past-the-post elections, the racial margin of victory (assuming no ties and rounding the difference) can be computed as below.

$$\text{Racial Margin of Victory} = \left| \frac{V^{tB} - V^{tW}}{2} \right|,$$

where V^{tB} represents the number of **v**otes received by the **t**op **b**lack candidate, V^{tW} represents the number of **v**otes received by the **t**op **w**hite candidate, and $|\cdot|$ is an absolute value operator.

In other words, the racial margin of victory can be calculated as half the absolute difference in the number of ballots received by the top black candidates and the number of ballots received by the top white candidates. Here, I do not consider the presence of run-off elections and assume that every election is a decisive election. Surprisingly, this measurement only depends on the ballots received by the top black and white candidates and is not a function of other factors such as the number of black and white candidates, the internal distribution of ballots within the same racial group, and relative advantages of black runner-up to white runner-up. In Appendix C, I consider all eight possible scenarios (i.e., from one black candidate with one white candidate to multiple black candidates with no white candidate) and demonstrate that only vote shares of the top black and white candidates are required to calculate the racial margin of victory.

The primary property of the racial margin of victory is that it does not distinguish the direction of racial change. Put differently, the concept is agnostic about whether the new winner is black or white after modifying the number of ballots. Removing the absolute value operator from it, however, enables us to calculate the minimum number of ballots that need to be modified in order to replace a black winner with a white winner. I call it as a *signed racial margin of victory* and define it as follows:

$$\text{Signed Racial Margin of Victory} = \frac{V^{tB} - V^{tW}}{2}$$

For example, when the top black and white candidates received 40% and 30% of ballots, respectively, the signed racial margin of victory is 5 because in order to replace the black winner with the white winner 5% of votes must be modified. When V^{tW} is larger than V^{tB} the signed racial margin of victory becomes a negative quantity. As both quantities are between 0 and 100, the signed racial margin of victory takes values between -50 and 50. Substantively, as the signed racial margin of victory gets larger, I could assume that black candidates did better jobs of securing their seats, and thus descriptive representation, relative to their white counterparts.

In the model, I operationalized racial electoral performance – the extent to which minority candidates safely secure their descriptive representation relative to their white counterparts – by $\frac{\widehat{V}_{it}^{B} - \widehat{V}_{it}^{W}}{2}$, which is equivalent to the signed racial margin of victory, and this measurement is universal across different electoral contexts (see Appendix C). As such, this part of the model powerfully connects my theoretical concept with an empirically relevant quantity and grants a strong theoretical implication to the model prediction. Figure 6 in Appendix A displays the distribution of the racial electoral performance variable by racial regime. In the next section, I use the outcome and independent variables of interest discussed here and present the results.

5 Results

5.1 Racial Electoral Performance and Minority Candidate Emergence

I begin by estimating the bivariate relationship between racial electoral performance and minority candidate emergence using a Bayesian logistic regression. The results are shown in column 1 of Table 1. The results represent that a higher racial electoral performance is associated with a greater chance of observing minority candidates. To account for a set of potential confounders which both affect racial electoral performance at $t-1$ and minority candidate emergence at time t as described in a directed acyclic graph in Appendix E, I next include several covariates including the district-level black voting-age population, black and white education level, and election cycle and apply district and year specific random intercepts to account for other unobserved potential confounders. The results shown in column 2 indicate that the relationship between racial electoral performance and minority candidate emergence still holds, granting some evidence for Hypothesis 1.

To evaluate my claim on the relative effect size of racial electoral performance, I now estimate the logistic regression by featuring random coefficients for racial electoral performance by racial regime. Column 3

	Column (1)	Column (2)	Column (3)	Column (4)
REP	.085 (.077, .093)	.048 (.039, .058)		
REP (majority white district)			.039 (.025, .053)	.065 (.042, .089)
REP (racially balanced district)			.051 (.039, .063)	.078 (.059, .098)
REP (majority black district)			.062 (.039, .087)	.082 (.040, .128)
Covariates		✓	✓	✓
Random intercept (Years)		✓	✓	✓
Random intercept (Districts)		✓	✓	✓
N	2037	2037	2037	1169

Table 1: **The Effect of Racial Electoral Performance on Minority Candidate Emergence**
Note: This table reports the posterior estimates for the coefficients of interest in Bayesian logistic regression.

reports the results, demonstrating that in all racial regime racial electoral performance is positively associated with the likelihood of observing minority candidate. To facilitate the interpretation, I plot the predicted probabilities of minority candidate emergence against racial electoral performance by racial regime based on the results on column 3. Here, I calculate the predicted probabilities using median values of covariates for each racial regime to make a more realistic comparison across racial regime.

If the propose model has a valid explanatory power, I expect to see a similar picture to the simulated results in Figure 2. The predicted probabilities presented in Figure 4 show that this is exactly the case. The figure illustrates that the substantive effect of racial electoral performance (i.e., the difference in predicted probabilities evaluated at the minimum and maximum racial electoral performance) is larger in racially balanced districts than in majority white or majority black districts. In racially balanced districts, the change in past performance from the lowest to the highest seems to boost the predicted probability about 0.8, whereas the change in the same condition seems to be more modest and about 0.2 in majority white districts and 0.4 in majority black districts. This provides a strong evidence for Hypothesis 2 that the value of past elections as a heuristic is higher in racially balanced districts.

5.2 Internal Validity

To ensure the internal validity of the above results, I performed multiple robustness checks by excluding all unopposed elections (column 4 in Table 1) as well as employing different cutoff points for racial regime and subsetting data before and after 2005 (Appendix F). I apply these robustness checks since my original results could stem from a particular definition of racial regime, racial electoral performance based on unopposed elections, and data within particular time periods. Moreover, I conducted placebo tests using the presence

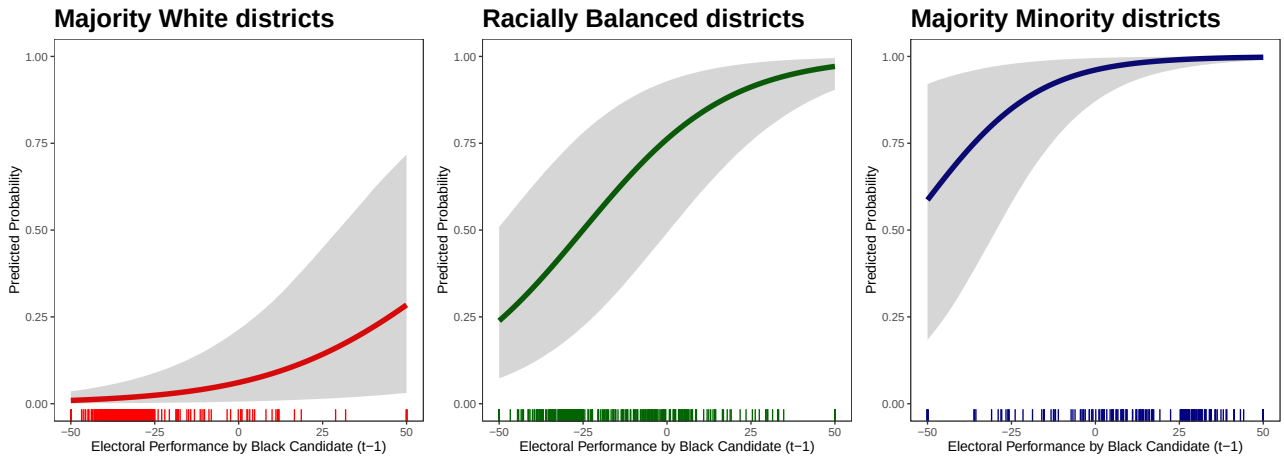

Figure 4: **The Substantive Effects of Racial Electoral Performance on Minority Candidate Emergence by Racial Regime**
Note: This figure displays predicted probabilities (bold curves) that black candidates running for office under three racial regimes with 95% credible intervals (gray shades). Rug plots are added to show the empirical distributions of the racial electoral performance variable in my data.

of female candidates as a placebo outcome to check if the variable of interest only affects outcome values related to racial politics. The idea is that if the proposed model is theoretically sound, it must *not* predict female candidate emergence. Figure 5 portrays the results of the placebo tests. The results demonstrate that both the black population size and the racial margin of victory do not have any bivariate relationship with female candidate emergence. One exception is that in majority minority districts there seems to be a slight association between the racial margin of victory and female candidate emergence. I suspect that this may be due to a potential correlation between race and gender of candidates. My substantive results are not susceptible to differences in measurements and the presence of unopposed elections, while they are not a product of mere chances.

5.3 Predictive Power

To further examine the predictive power of my model, I also generate the predicted values for the black candidate emergence based only on Equation (4). I then calculate the percentage correctly predicted (PCP) and expected PCP (ePCP) based on our predicted values and observed outcomes in the data. While the PCP provides the percentage of observations for which the model can correctly predict their values, the ePCP also accounts for "how close" such predictions are (Herron, 1999). Both results are reported in Table 2.

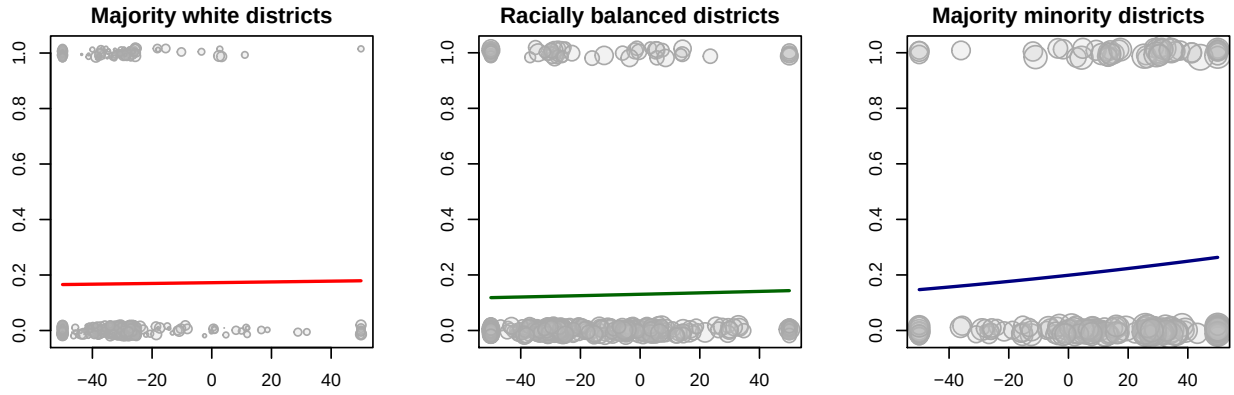

Figure 5: **Placebo Tests with Female Candidate Emergence as the False Outcome Variable**
Note: This figure visualizes the results of placebo tests showing the bivariate relationships between racial electoral performance and the presence of female candidates. If the proposed model is theoretically sound, it must not predict female candidate emergence, and I confirmed this point in all racial regime. The size of open circles is proportional to the size of black voting-age population.

	PCP (%)			ePCP (%)		
	$\Phi(0,3)$	$\Phi(0,9)$	$\Phi(0,15)$	$\Phi(0,3)$	$\Phi(0,9)$	$\Phi(0,15)$
Full Model	88.0	88.0	88.0	87.9	87.4	86.3
Last Election Only	87.5	87.5	87.5	87.4	86.7	85.6
Racial Composition Only	87.2	87.2	87.2	87.1	85.2	82.4

Table 2: **Predictive Power of the Unified Logical Model**
Note: This table reports the percentage of observations for which the model correctly predicts their values (PCP) and its weighted measure (ePCP). PCP is calculated as $\frac{1}{N}\sum_{i=1}^{N}\mathbb{1}(y_i = \widehat{y}_i)$, where $\widehat{y}_i = 1$ if $\widehat{P}_i > 0.5$ and N is the number of observations. ePCP is calculated as $\frac{1}{N}(\sum_{y_i=1}\widehat{P}_i + \sum_{y_i=0}(1-\widehat{P}_i))$. Results are than multiplied by 100 to be in the percentage scale.

Here, I consider three different normal CDFs with the same mean and different variances for $\mathbf{F}$. Recall that the variance in the model accounts for the degree of potential miscalculation given incomplete information all candidates have. While the logical model produces has the same predictive power based on the PCP, ePCP shows that the model with the lowest variance seems to have the highest predictive power. Row 1 shows that *only based on the theoretical model* we can correctly predict about 88% of cases in our data. This result is rather remarkable because, again, our prediction is based only on our logical model and not machine learning or other predictive models.

Rows 2 and 3 also report results based on the model only with the last election and racial composition term, where α is set to 0 or 1, respectively. While both reduced models seem to have higher predictive power, their PCP and ePCP are lower than those of the full model. It should be noted that the logical model does

more than accounting for the two variables both theoretically and empirically. To illustrate this point, I run a logistic regression with the proportion of blacks and racial electoral performance and generate a predictive value for each observation. The ePCP based on this atheoretical regression is 83.3 and this is a lot lower than the results based on the theoretical model. In fact, the logistic regression even has a lower predictive power than the reduced theoretical models which have a single variable (Rows 2-3). This result demonstrates the power of logical models and that parsimonious theoretical models can often better describe the world than *ad hoc* statistical models with a large set of variables (Taagepera, 2008; Shugart and Taagepera, 2017).

6 Discussion

In the above, I have demonstrated that minority candidate emergence can be modeled as the decision-making process of minority candidates who evaluate prior odds of winning in electoral contests. I have also provided supportive evidence for my argument by empirically testing observable implications from the model. In this section, I further discuss a broader implication of the model and resolve remaining theoretical issues.

First, some readers may wonder if the proposed model can be applicable to a broader set of electoral contests. I argue that the model is relevant for most elections conducted under the simple FPTP system with single-member districts. Such "simple" cases include many U.S. local elections, which are often non-partisan, and primary elections in various levels. In contrast, the proposed model cannot be directly applied to more complex systems, including the U.S. presidential primaries, general elections, and elections with different ballot structures such as ranked-choice voting and limited voting (John, Smith and Zack, 2018).

In these cases, the concept and calculation of margin of victory are often more complicated (Magrino et al., 2011; Xia, 2012) and it is relatively hard to theoretically explain the role of racial electoral performance as a useful heuristic for calculating the prior odds of winning. To understand minority candidate emergence in general elections is similarly challenging since the lack of minority candidates in general elections can mean either the absence of minority candidates *or* the defeat of minority candidates at the primary stage (Fraga, 2014). In the former case, minority candidate emergence at the general stage is a deterministic function of the one at the primary level, whereas it is not the case in the latter. Future research must expand the scope conditions to these more complex systems.

Next, the proposed model only accounts for minority candidate emergence in elections with two racial groups (Assumption 1). While the State of Louisiana fits the assumption, many districts in other states

have more than two dominant racial groups. Thus, to expand the scope of the logical model to multiracial elections it is necessary to consider how to modify the concept of racial electoral performance in such environments. One potential approach is to think about biracial election as contests with one racial group and the other groups combined for each group. For instance, suppose that there are three groups of whites, hispanics and asians in a district. Then, racial electoral performance can be calculated for asian candidates based on past and expected racial margin of victories between the top asian candidate and top non-asian candidate. This strategy coincides with the current scholarship where researchers often consider the proportion of whites, blacks, hispanics, and asians as relevant predictors of minority candidate emergence (Fraga, Juenke and Shah, 2019). Future research must generalize the proposed model by incorporating multiple racial groups.

One potential confusion about the model could be that the model is taken as a model of *minority candidate success*. Therefore, it does not have any explanatory and predictive power if no minority candidate has ever run in a particular district. Moreover, the model cannot explain why the first minority candidate decided to run in a district. However, this is in fact an incorrect interpretation of the model. A more proper view is that the proposed model is a model of the "relative strength" of top minority candidate and top white candidate. To illustrate this point, let us consider an extreme case where there were ten white candidates and no black candidate at time $t-1$ in a district. Suppose that 80% and 20% of the electorate are white and black voters, respectively. Suppose also that the ten white candidates almost equally divided vote shares so that the vote share of the top white candidate was 10% plus few votes. Under this condition, racial electoral performance becomes approximately 5, which means that if a black candidate had been running in the district and obtained at least 5% plus few votes she could have been a winner. For this reason, the model states that minority candidates can emerge from majority white districts if electoral environments are favorable to them. As shown in Section 4 and Appendix C, racial electoral performance can be calculated regardless of the presence of minority candidate at time $t-1$. Thus, the model can be applied to districts where no minority candidate has appeared before.

Finally, it may seem that the model does not account for the role of political parties or partisanship of voters. However, as emphasized in Section 3, I have referred to candidates *and* their teams as simply candidates. And I modeled the decision-making process of candidates and their teams altogether under the framework of bounded rationality. Thus, such decision-making can be also seen as the recruitment process by party stuff and leaders as some studies have considered (Shah, 2014; Juenke, 2014). On the other hand,

it is true that the model does not explicitly include the effect of partisanship of candidates and voters on the decision-making process. However, such effect is indirectly incorporated in racial electoral performance at time $t-1$. If partisanship plays a role in minority candidate emergence such that parties attempt to push particular candidates to elect their own candidates, this strategic coordination must be reflected in racial electoral performance (Cox, 1997). That is, if there is any partisan coordination behind few candidates vote shares among candidates must have a skewed distribution, which in turn affects racial electoral performance. As a result, the role of parties is already included in the model under the stated assumptions. Nevertheless, it does not handle partisanship in the two-stage elections and such problem must be solved in future research.

7 Concluding Remarks

In this article, I developed a novel predictive model of minority candidate emergence and empirically verified several observable implications from the model. The proposed model unifies previously divided two theories of minority descriptive representation and clarifies the decision-making process of minority candidates. This article also introduced a new concept of racial electoral performance by connecting minority candidate emergence with the notion of the margin of victory. Remarkably, it was shown that the proposed logical model has higher predictive power than an atheoretical statistical model even when the former has few variables than the latter. One important implication of the results is that while creating majority minority districts has a large influence on the minority candidate supply, strategic coordination among minority candidates seems to be equally crucial for minority descriptive representation. To what extent does such minority candidate coordination exist? What enables successful coordination and what consequences does it have on the victory of minority candidates? By drawing from logical models, this article shed new lights on strategic candidate entry and minority descriptive representation.

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Appendices

A Racial Electoral Performance

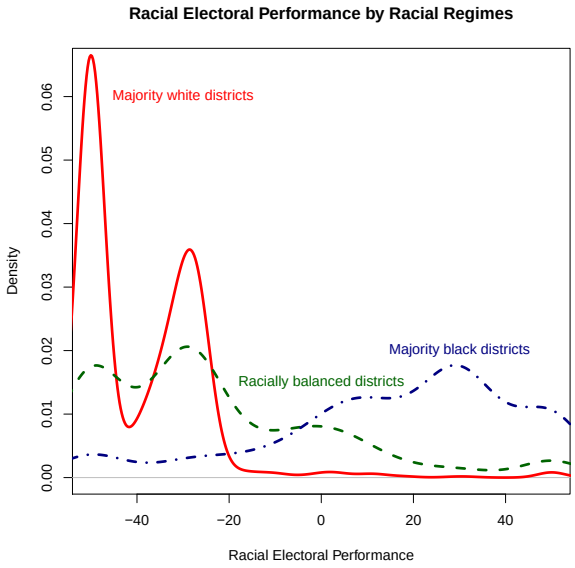


Figure 6: **The Distribution of the Treatment Variable by Racial Regime**
Note: This graph visualizes the distribution of the treatment variable by racial regime.

B Registration by Race

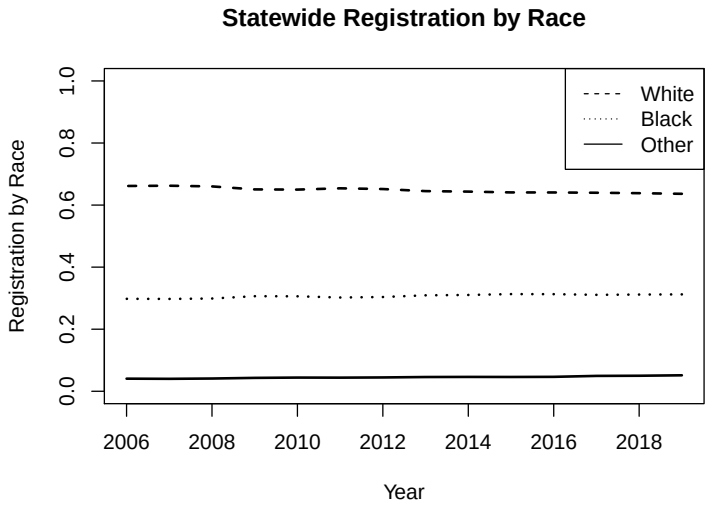


Figure 7: **Registered Voters by Self-Reported Race**
Note: This plot represents the statewide voter registration record by self-reported race in Louisiana from 2006 to 2019. The data was collected from Louisiana Secretary of State website. It demonstrates that the proportion of registered voters who identify themselves neither as white or black ranges from about 0.0401 to 0.0515, giving some justification for considering non-partisan mayoral elections as biracial elections.

C Racial Margin of Victory

Here, I examine all possible different patterns of biracial elections and demonstrate that the racial margin of victory introduced in Section 3 can be applied to any type of elections. Recall that the racial margin of victory refers to the minimum amount of vote shares I need to modify in order to change the race of the winner in an election.

C.1 One black candidate, one white candidate

When there are only one black candidate and white candidate, respectively, on a ballot, all the possible patterns of electoral results can be obtained from the following permutations.

1st:	W	B
2nd:	B	W

In order to change the race of the winner, I am required to change the order of the winner and runner-up, which can be done at least with $|1/2 * (V_b - V_w)|$ votes, where V_b is the number of **v**otes received by **b**lack candidates and V_w the number of **v**otes obtained by **w**hite candidates. Since there are only one black candidate and only one white candidate (i.e., the black (white) candidate is always the top black (white) candidate), $|1/2 * (V_b - V_w)| = |1/2 * (V_{bt} - V_{wt})|$.

C.2 One black candidate, multiple whites candidates

When there are one black candidate and multiple white candidates, I only focus on the difference in the race of candidates. In other words, I do not distinguish one white candidate from another and only consider whether the ballot modification would lead to a winner with a different race from the original winner. Assuming that there are one black candidate and two white candidates, all the possible electoral outcomes are as follows.

1st:	W	W	B
2nd:	*W*	B	W
3rd:	B	*W*	*W*

In the first pattern (column), what I focus on is the difference in the number of ballots received by the top white candidate and the black candidate. And this applies to all other two patterns. Thus, the racial margin of victory is computed as $|1/2 * (V_b - V_{wt})| = |1/2 * (V_{bt} - V_{wt})|$, since the black candidate on a ballot is always the top black candidate. Because the above quantity does not depend on the number of white candidates, the above equation remains the same even when I have more than three white candidates.

C.3 Multiple blacks candidates, one white candidate

In elections with two black candidates and only one white candidate, the possible ordering of candidates is shown as below.

1st:	W	B	B
2nd:	B	W	*B*
3rd:	*B*	*B*	W

Following the same logic as the last case, the racial margin of victory is calculated as $|1/2*(V_{bt}-V_w)| = |1/2 * (V_{bt} - V_{wt})|$. Since this does not depend on the number of black candidates, it can be extended to elections with more than three black candidates.

C.4 Multiple black candidates, multiple white candidates

When there are two black and two white candidates on a ballot, the following covers all the possible electoral outcomes.

1st:	W	W	W	B	B	B
2nd:	W	B	B	W	W	B
3rd:	B	W	B	B	W	W
4th:	B	B	W	W	B	W

Here, it requires only $|1/2 * (V_{bt} - V_{wt})|$ to change the race of the winner. Since this is not a function of the number of black and white candidates, it can be extended to elections with more than three black or white candidates.

C.5 No black candidate, one white candidate

When an election is an unopposed election with a white winner, all the possible pattern is as follows.

1st: W

Now, this can be considered as a special case of 1. (One black candidate, one white candidate), where the black candidate received zero vote. Thus,

1st: W (V = 100)
2nd: B (V = 0)

Consequently, the racial margin of vote can be computed as $|1/2 * (V_b - V_w)| = |1/2 * (0 - V_{wt})| = 1/2 * V_{wt}$. And EPBC can be measured as $-1/2 * V_{wt}$.

C.6 No black candidate, multiple white candidates

When there are more than one white candidates with no black candidate, the possible electoral outcome can be demonstrated as follows:

1st: W
2nd: W
...

Now, this can be thought of as a special case of 2. (one black candidate, multiple white candidates) where the black candidate received zero vote. Thus,

1st: W
2nd: W
...
Last: B (V = 0)

Following the above explanation, the racial margin of victory can be computed as $|1/2 * (V_{bt}V_{wt})| = |1/2 * (0V_{wt})| = 1/2 * V_{wt}$. Here, by definition, $1/2 * V_{wt}$ (as in 6.) $\leq 1/2 * V_{wt}$ (as in 5.).

C.7 One black candidate, no white candidate

In a case of unopposed election with a black winner, the possible electoral result is the mirrored version of 5. Thus,

1st: B

which can be rewritten as

1st: B (V = 100)
2nd: W (V = 0)

Therefore, the racial margin of victory can be computed as $|1/2 * (V_b - V_w)| = |1/2 * (V_{bt} - 0)| = 1/2 * V_{bt}$. And EPBC can be similarly measured as $1/2 * V_{bt}$.

C.8 Multiple black candidates, no white candidate

This is a mirrored version of 6. and all the possible patterns can be shown as:

1st: B
2nd: B
...
Last: W (V = 0)

Thus, the racial margin of victory can be computed as $|1/2 * (V_{bt} - V_w)| = |1/2 * (V_{bt} - 0)| = 1/2 * V_{bt}$. By definition, $1/2 * V_{wt}$ (as in 8.) $\leq 1/2 * V_{wt}$ (as in 7.).

D Coding Racial Regime

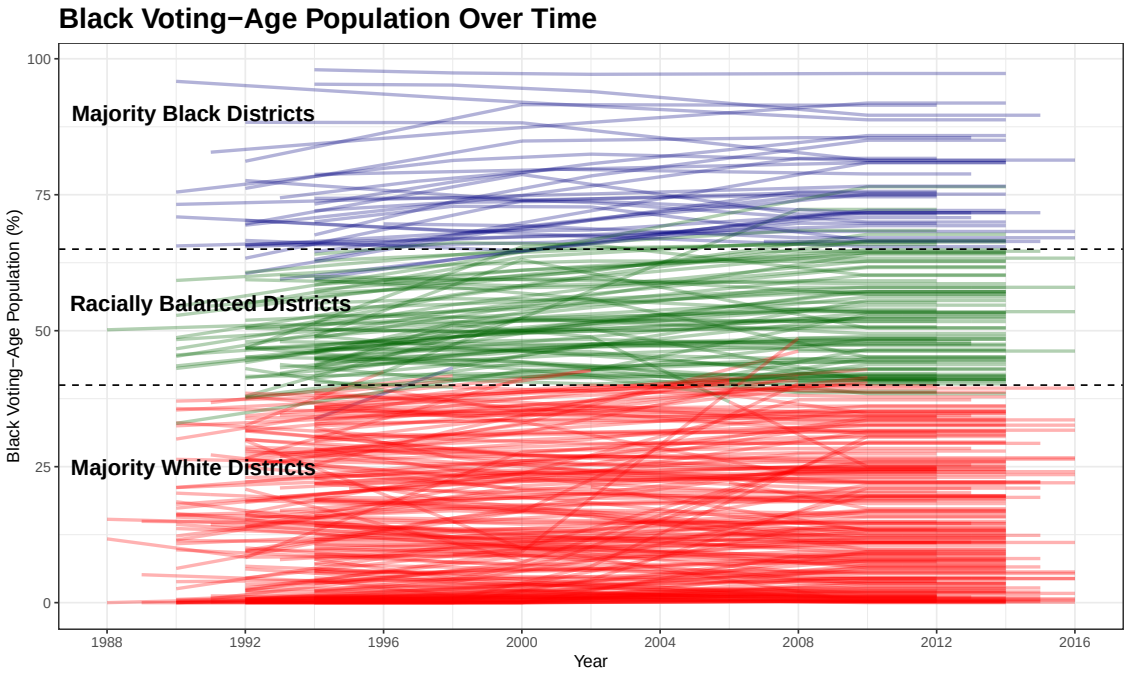
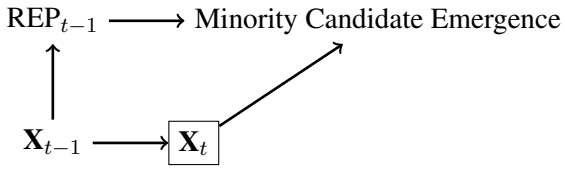


Figure 8: **The changes in black voting-age population over time by racial regime**
Note: This graph visualizes the changes in black voting-age population for all districts over time as well as their corresponding racial regime. It demonstrates that very few districts experience a dramatic demographic change such that the percentage of black voting-age population crosses the boundaries of racial regime (i.e., 40% and 65%).

E A Directed Acyclic Graph

To parse out the causal effect of racial electoral performance on minority candidate emergence, I identify the following directed acyclic graph (DAG). Here, "REP_{t-1}" is the treatment of interest, "Minority Candidate Emergence" is the outcome of interest, and "$\mathbf{X}_{t-1}$" is a set of confounders that affect both the treatment (directly) and the outcome (indirectly).



F Robustness Checks

Here, I performed multiple robustness checks by employing different cutoff points for racial regime, excluding all unopposed elections, and subsetting data before and after 2005. The estimated posteriors with lower and upper credible intervals are shown in Table 3.

	40/65%	35/65%	30/65%	25/65%
REP (majority minority)	.039 (.025, .053)	.039 (.024, .054)	.042 (.025, .059)	.040 (.022, .058)
REP (racially balanced)	.051 (.039, .063)	.048 (.037, .060)	.047 (.036, .057)	.047 (.036, .057)
REP (majority white)	.062 (.039, .087)	.068 (.044, .094)	.067 (.042, .093)	.067 (.042, .092)
Covariates	✓	✓	✓	✓
RE (Years)	✓	✓	✓	✓
RE (Municipalities)	✓	✓	✓	✓
N	2037	2037	2037	2037

	40/70%	40/75%	40/80%	35/70%
REP (majority minority)	.039 (.026, .053)	.039 (.025, .052)	.040 (.027, .054)	.040 (.026, .055)
REP (racially balanced)	.051 (.040, .063)	.051 (.040, .063)	.053 (.042, .064)	.050 (.039, .060)
REP (majority white)	.075 (.039, .113)	.085 (.041, .132)	.038 (-.028, .110)	.073 (.037, .111)
Covariates	✓	✓	✓	✓
RE (Years)	✓	✓	✓	✓
RE (Municipalities)	✓	✓	✓	✓
N	2037	2037	2037	2037

	30/75%	25/80%	Before 2005	After 2005
REP (majority minority)	.043 (.026, .060)	.043 (.026, .061)	.043 (.021, .065)	.037 (.016, .057)
REP (racially balanced)	.048 (.038, .058)	.049 (.040, .060)	.049 (.032, .066)	.061 (.043, .081)
REP (majority white)	.082 (.038, .129)	.036 (-.027, .106)	.059 (.031, 087)	.086 (.006, .201)
Covariates	✓	✓		
RE (Years)	✓	✓	✓	✓
RE (Municipalities)	✓	✓	✓	✓
N	2037	2037	1166	871

Table 3: **Estimated Results with Different Cutoff Points and Subset of Data**
Note: This table shows the posterior estimates of the effect of racial electoral performance on minority candidate emergence using different cutoff points for racial regime and subsets of data. The results demonstrate that the original result is not susceptible to these changes in the definition and time periods for analysis.