Essays on Political Competition and Issue Selection

Yohei Yamaguchi

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Yohei Yamaguchi

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1 Introduction

1.1 Thesis Objective

In political campaigns, political parties attempt to advocate their policy stance and assert their superiority against their rivals. On the other hand, another important aspect of a political campaign is the parties' strategies to attract voters' attention to a specific issue, such as unemployment, education, inequality, crime, religion, national defense, foreign policy, immigration, and so on. The strategy that parties direct voters' attention toward a specific issue is sometimes referred to as *issue selection* (Aragonès et al., 2015; Dragu and Fan, 2016).[1]

Using data from U.S. presidential elections, political scientist John R. Petrocik analyzes the types of issues each candidate attempts to highlight to attract voters' attention during elections (Petrocik, 1996; Petrocik et al., 2003). According to Petrocik's *issue ownership* theory, political parties have an advantage on certain issues due to their accumulated reputation and expertise. Consequently, each party has an incentive to emphasize the issues it owns. Typically, Democratic candidates enjoy an advantage in domestic concerns such as unemployment, education, inequality, civil rights, and healthcare. Conversely, Republican candidates often find an edge in national defense, undocumented immigration, and religious issues. Noteworthy examples include Bush's championing of the *war on terror* and his staunch opposition to same-sex marriage and gay rights during the 2004 election.

Issue selection is a widely observed phenomenon in the political arena, and it appears to exert a non-negligible impact on electoral outcomes. Consequently, numerous studies have been conducted in this research area. The primary objective of these studies is to investigate when and what type of issue candidates have an incentive to direct voters' attention to. For instance, researchers examine the types of issues each political party takes ownership of (*issue ownership*), whether parties tend to emphasize the same issues as their opponents during an election (*issue convergence*), and the possibility of political parties "stealing" issues owned by their opponents (*issue stealing*). As we will delve into later in the literature review section, multiple observations addressing these questions have already been made from both empirical and theoretical perspectives.

[1] To the best of my knowledge, there is no consensus on what to call this political strategy. Following Aragonès et al. (2015) and Dragu and Fan (2016), we refer to parties' strategies that emphasize the importance of a specific issue in an electoral campaign as "issue selection."

However, it seems that the research area is still underexplored from a normative viewpoint. In other words, we lack a precise answer to the question of how parties' incentives to manipulate voters' attention toward a specific issue affect social welfare. From a normative perspective, issue selection seems to have two primary effects.

Distorting effect. Political dynamics involve navigating a multitude of issues, rendering political competition inherently multidimensional. Ideally, politicians should attentively address voters' authentic concerns across various domains and present comprehensive platforms to tackle them. However, there exists an incentive for politicians to manipulate the focus of voters, steering attention toward issues advantageous to their party. This manipulation can have adverse effects, as it may result in the overemphasis of certain issues at the expense of others that are genuinely important but deemed challenging to tackle. For example, in the U.S., Republicans often emphasize religious issues such as abortion and same-sex marriage. This strategy faces criticism from leftist circles, as it has the potential to shift voters' attention away from critical issues like income inequality. While acknowledging the importance of religious concerns, excessive focus on a particular matter by voters may lead to distortions in addressing other pivotal political considerations.

Informative effect. On the flip side, a strategy that addresses key policy issues in an election can convey valuable information to citizens and potentially have a positive impact on society. Given the inherently multidimensional nature of politics, where various issues demand attention, voters often face constraints in time and information when making decisions. In this context, parties' issue selection can assist voters in understanding crucial policy matters and provide valuable information regarding these issues. Take welfare reform, for instance—an undeniably important issue that might not naturally attract voter interest due to its complexity. However, if political competition encourages parties to underscore the significance of such issues and provide policy-related information, even though it may divert attention from more subtle concerns, it could contribute to helping voters make more informed decisions.

The thesis focuses on the first aspect—the distorting aspect of issue selection. This can be considered as the initial step in opening the door to explore the normative dimension of parties' issue selection strategy. Ideally, both the distorting and informative aspects of the issue selection strategy should be examined concurrently. Despite the evident importance of the informative effect of issue selection, there is, however, little related literature addressing the topic, and the present paper is no exception.[2] Nevertheless, we assert that delving into the distorting aspect of issue selection is crucial and can be considered a significant stride toward investigating the normative dimension of issue selection.

In this thesis, we analyze parties' issue selection strategy and its electoral outcomes from three perspectives: (i) the impact of media competition and issue selection on issue salience, (ii) the impact of parties' issue selection strategies on income inequality, and (iii) the impact of political misinformation, which has a similar structure to issue selection, on criminal law enforcement. These perspectives will be further elaborated upon below.

1.2 Three perspectives

In this section, we provide an overview of each chapter that examines the effect of issue selection on electoral outcome from the following three perspectives.

Chapter 2: Issue selection, media competition, and polarization of salience

Chapter 2 is based on Yamaguchi (2022), entitled "Issue selection, media competition, and polarization of salience" published in *Games and Economic Behavior* 136:197–225.

The primary objective of this chapter is to analyze the interplay between media competition and parties' strategies for selecting issues, and how these factors influence issue salience and electoral outcomes. The role of media is crucial in issue selection because voters perceive political campaigns through media reporting. However, to the best of my knowledge, no study has explored the impact of media competition on parties' issue selection. In this chapter, we develop an issue selection model that incorporates the profit-maximization behavior of media outlets. The results can be summarized in three main components. Firstly, we find that media outlets' issue coverage diverges even when they lack ideological preferences. Secondly, competition among media outlets and the strategic issue selection by parties contribute to the *polarization of issue salience*, meaning that one group of voters places greater emphasis on a specific issue, while another group of voters prioritizes a different issue. Finally, we demonstrate that this

[2]The exception is Egorov (2015), which investigates the possibility that issue selection transmits information about the candidate's policy quality. However, it does not address the distorting aspect of issue selection since voters' salience weights are fixed.

polarization increases the vote share of the party with lower-quality policy proposals.

These findings have several implications. Firstly, our results provide an explanation for instances where polls indicate a polarization of issue priorities among voters. For instance, some voters emphasize economic distribution problems as crucial, while another group considers religious issues like abortion and same-sex marriage to be significant. We propose one possible mechanism to explain this phenomenon by combining the behavior of media outlets and parties' issue selection. Secondly, our analysis reveals that such polarization can have adverse effects: *polarization of issue salience* contributes to an increase in the vote share of the party with inferior policy proposals, a point not previously emphasized in the existing literature. These results are essential for comprehending the intricate relationship between issue salience, media, and their collective influence on electoral competition.

Chapter 3: Issue selection, inequality, and polarization of social ideologies

Chapter 3 is based on a working paper that shares the same title as this chapter.

The central question of this chapter is as follows: In electoral competitions, political parties attempt to address key political issues, such as economic distribution problems and social issues (e.g., abortion and same-sex marriage). What factors prompt parties to choose which issues to emphasize and how does this dynamic intersect with their policy platforms?

To address this question, this chapter develops an issue selection model between liberal and conservative parties with fixed social ideological positions and explores how parties' issue selection strategies interact with their tax proposals. The findings reveal that the polarization of social ideologies (i.e., the distance between two ideological positions widens) motivates both parties to manipulate the salience weights of low-income/conservative voters during political campaigns. This pattern makes conservative parties prioritize social issues, while liberal parties emphasize problems related to economic distribution. Furthermore, this equilibrium indicates that if voters are more likely to shift their attention toward social issues due to political campaigns, both parties advocate for tax reductions, contributing to an increase in income inequality.

These findings carry several implications. Firstly, our results indicate that the polarization of social ideologies plays a pivotal role in determining which issues to emphasize and which types of voters each party seeks to target during a political campaign. Secondly, our results elucidate why parties might propose lower tax rates even in the face of rising income inequality.

Our explanation is as follows: when social ideology becomes polarized, both parties attempt to manipulate the issue salience for low-income/conservative voters. This motivates liberal parties to emphasize economic distribution problems, while conservative parties emphasize social issues. Then, if there is a situation where voters lean toward a social issue, the impact of the conservative party's campaign outweighs that of the liberal party. As a result, low-income voters shift their attention toward social issues such as religion, while high-income voters are less susceptible to such changes. This dynamic prompts both parties to attempt to lower taxes to cater to the demands of high-income voters. This result can be considered as one possible explanation for why politicians seem reluctant to address income inequality from the viewpoint of issue salience.

Chapter 4: Law enforcement and political misinformation

This chapter is based on Yamaguchi and Yahagi (2023), entitled "Law enforcement and political misinformation," co-authored with Ken Yahagi and forthcoming in the *Journal of Theoretical Politics*.

This chapter investigates parties' issue selection strategy from a different perspective: political misinformation. It specifically examines political competition regarding law enforcement policies for crimes and assumes that political parties can disseminate misinformation about the harm caused by crimes. This form of misinformation shares the same structure as the issue selection strategy discussed earlier. If voters perceive the crime situation to be more severe than reality due to political campaigns, it is equivalent to them believing that crime-related issues are more salient, and vice versa.

Building on this observation, the central question of this chapter can be stated as follows: Why has criminal law enforcement become increasingly punitive, despite improvements in the situation over the decades? This chapter provides an answer from the perspective of parties manipulating voters' perceptions about the crime situation (misinformation). To this end, we develop a law enforcement model combined with political competition and examine how political parties' campaigns affect voters' perceptions of crime and the equilibrium law enforcement policy. During a political campaign, we demonstrate that one political party has an incentive to exaggerate the severity of crime, while the other party has an incentive to correct voters' beliefs. However, even though the two parties attempt to shift voters' beliefs in opposite directions, we show that the cumulative effect of a political campaign is more likely to drive both parties' policies in a harsh direction.

The first result of this chapter follows a similar structure to the *issue ownership theory*, as seen in works such as Amorós and Puy (2013); Aragonès et al. (2015); Dragu and Fan (2016); Denter (2020): The party that claims ownership of the crime policing issue has an incentive to exaggerate the crime situation, essentially aiming to capture voters' attention toward the issue the party has advantage. Conversely, the other party has an incentive to divert voters' attention towards a different issue because it does not have issue ownership for crime-related issues.

The second result stems from the fact that voters experience an increasing marginal disutility concerning criminal harm. Consequently, the impact of a campaign that exaggerates the severity of criminal harm outweighs that of a campaign that corrects or understates the severity. This leads to the conclusion that even when each party attempts to manipulate voters' perception of criminal harm in opposite directions by the same degree, the cumulative effect of the issue selection strategy leads to punitive law enforcement. These results indicate that a political campaign that affects voters' perception regarding crime may have adverse effects, pushing criminal law enforcement unnecessarily in a harsh direction.

1.3 Related literature

This section introduces the related literature that explores political parties' issue selection strategies and issue salience, a common theme throughout the main chapters of the thesis. Additionally, the section delves into another related research area with connections to issue selection: political campaigns and advertisements. While there is additional pertinent literature, such as media competition (Chapter 2), income inequality and social ideologies (Chapter 3), and law enforcement for crimes (Chapter 4), we will address these related topics within their respective chapters.

1.3.1 Early contributions

A pioneering contribution to this research field can be found in the works of Riker (1993) and Petrocik (1996), both of whom investigate how political parties choose the issues to emphasize during a political campaign. In Riker (1993), the *dominance/dispersion principle* is proposed. This principle argues that when one party has a clear advantage on a certain issue, it has an incentive to emphasize that issue to voters. Conversely, the opposing party has an incentive to downplay the issue during the political campaign. Therefore, each party not only emphasizes its strength but also its opponent's weaknesses. However, the dominance/dispersion principle does not clearly address the circumstances under which a political party gains a clear-cut advantage on a particular issue (Aragonès et al., 2015).

On the other hand, Petrocik (1996) introduces the *issue ownership theory*, which posits that political candidates emphasize issues in which they have an advantage, while their opponents are less well-regarded. This idea is based on the *selective emphasis* thesis, put forth by Budge and Farlie (1983). According to the issue ownership theory, candidates' ownership of issues is determined by their reputation and voters' perceptions of their competence in handling those issues. This may arise from the technical expertise of parties in addressing the issue or the biased perception of voters regarding parties' ability to handle the issue. Using data from U.S. presidential elections between 1960 and 1992, Petrocik (1996) demonstrates that the Democratic party claims issue ownership of education and the protection of disadvantaged groups, whereas the Republican party claims issue ownership of crime, moral values, defense, and foreign policy.

1.3.2 Empirical studies

After the emergence of the dominance/dispersion principle and the issue ownership theory, several empirical studies were conducted to verify the plausibility of these theories. For example, Petrocik et al. (2003) analyzed candidates' acceptance speeches in U.S. elections and TV ads, identifying the issues mentioned and owned by the Democratic and Republican parties.

On the other hand, several studies attempt to refine Petrocik's issue ownership theory. For example, Pope and Woon (2009) sought to measure changes in the parties' reputation over time. They demonstrated that parties' reputations are not stable. Despite the Democrats' advantage on social welfare issues, Republicans have recently made some gains in this area. Conversely, the Republican advantage on law and order and taxes has been weaker. In relation to this topic, utilizing content analysis, Holian (2004) demonstrated how Bill Clinton's rhetoric successfully neutralized the Republican advantage on issues related to crime and affected media coverage of the crime issue. Also, through a large-scale online experiment in Belgium, Walgrave et al. (2009) demonstrated that voters' perceptions about which party owns each issue are malleable and can be manipulated. In this experimental study, which utilized fake TV news items, Walgrave et al. (2009) showed that exposure to news leads to a significant shift in issue ownership.

Also, several studies investigate the effect of issue ownership on electoral outcomes. Bélanger and Meguid (2008) focused on the effect of issue ownership on vote choice and showed that issue ownership affects the voting process only when voters perceive that the issue is salient to them. Additionally, using data from British elections spanning from 1987 to 2005, Green and Hobolt (2008) showed that as parties have converged ideologically, issue ownership (i.e., valence considerations) has become more important than ideological position in British elections. Utilizing Denmark's election data spanning over 50 years, Green-Pedersen and Mortensen (2015) investigated the issue selection strategy of political candidates in multi-party systems. They found that parties are more responsive to the issues of parties within their own coalition rather than the agendas of the opponents' coalition.

Another strand of empirical literature focuses on *issue divergence* and *issue convergence* in political campaigns. According to Riker's dominance/dispersion principle and Petrocik's issue ownership theory, political candidates emphasize the issues they own while avoiding the issues owned by their opponents (*issue divergence*). However, several empirical studies show that in a political campaign, *issue convergence* is frequently observed, meaning that parties not only mention the issues they own but also refer to issues owned by their opponents.

For instance, through an analysis of statements made by presidential candidates and other campaign representatives spanning from 1960 to 2000, Sigelman and Buell Jr (2004) revealed that issue convergence is not an anomaly; rather, there is a significant degree of similarity in the issues emphasized by both political parties. In a study focused on television advertising in U.S. Senate campaigns occurring between 1998 and 2002, Kaplan et al. (2006) investigated the factors influencing issue convergence. They observed that issue convergence tends to increase as the electoral competition intensifies but decreases when there is a substantial disparity in financial resources between the two parties. Additionally, Damore (2005) demonstrated that issue convergence is widespread in presidential campaigns, and candidates' decisions to emphasize the same issues as their opponents are influenced by the salience of the issues and partisanship. In summary, the literature in this field widely agrees that political parties not only emphasize the issues they own but also engage with issues owned by their opponents.

1.3.3 Formal theories

There are several pieces of literature that analyze issue ownership and issue selection strategies using a game theoretic approach. Examples include Amorós and Puy (2013), Aragonès et al. (2015), Egorov (2015), Dragu and Fan (2016), Denter (2020), and Aragonès and Ponsatí (2022).

Amorós and Puy (2013) analyze the conditions under which issue convergence and issue divergence occur in an electoral competition. On the other hand, Dragu and Fan (2016) examine the issue selection model within a multidimensional policy space and demonstrate that the party with the lower equilibrium vote share has an incentive to emphasize more controversial issues, while the party with a high equilibrium vote share has an incentive to emphasize more consensual issues during the campaign. Aragonès et al. (2015) develop an issue selection model that takes into account investment in policy quality. In their model, parties decide on the amount of communication time spent to attract voters' attention and determine the level of investment needed to improve their policy quality. Using this setting, Aragonès et al. (2015) reveal the condition under which parties focus on their historically strong issues or attempts to steal the opponents' issues during the campaign. Denter (2020) analyze a model in which parties' campaign efforts simultaneously affect voters' attention (*priming*) and policy quality (*persuasion*). Denter (2020) find that considering both of these effects of campaign efforts can bridge existing theoretical and empirical research, explaining why *issue overlap* occurs in actual politics. Aragonès and Ponsatí (2022) analyze the effect of exogenous shocks on issue salience and its impact on parties' strategic issue selection. They demonstrate that when an exogenous shock occurs, both parties shift their emphasis to the ideal point of the median voter of the new salient issue.

The formal theory mentioned above can be considered to apply a black-box approach in that it does not clarify how and why voters change their perception rationally due to the political campaign. The papers in this thesis are no exception. One such instance is Egorov (2015), which analyzes a sequential move game involving two policy issues, where candidates can send a signal about the competence through issue selection. Then, Egorov (2015) demonstrates the conditions under which the second mover's choice of the same or different issue from the first mover's becomes informative to voters. However, Egorov (2015) does not consider the distorting aspect of issue selection because the research assumes that issue selection does not affect the issue salience.

Overall, the three main essays in this thesis follow the same line as Amorós and Puy (2013); Aragonès et al. (2015); Dragu and Fan (2016); Denter (2020); Aragonès and Ponsatí (2022), but we extend this line of research in a different direction. In Chapter 2, we expand the existing model by explicitly incorporating the role of media outlets and demonstrate how their interaction with parties' issue selection strategies affects electoral outcomes. In Chapter 3, we investigate how issue selection strategy interacts with horizontally differentiated policy platforms (specifically, tax policy) from the perspectives of income inequality and social ideologies, which are understudied areas in existing research. In Chapter 4, using a combined political competition model with law enforcement, we describe how political parties can manipulate issue salience by disseminating misinformation—either by overstating or understating the crime situation—and how this strategy leads to punitive law enforcement. Also, in these three essays, we emphasize the distorting aspect of issue selection campaigns, i.e., the possibility that the parties' manipulation of issue salience may lead to an excessive emphasis on a certain issue or downplay the importance of other crucial issues, distorting the resource allocation.

1.3.4 Political campaigns and advertisements

Up to this point, we have referred to the related literature on issue selection. Moving forward, we would like to provide an overview of another research topic closely associated with issue selection: political campaigns and advertisements. Issue selection can be seen as a specific aspect of political campaigns and advertisements, and there is a significant body of literature in this research domain.

There are several models in political campaigns and advertisements. The most relevant research topic to the current thesis would be the positive/negative campaign in a spatial model. This research topic shares a similar structure with the issue selection model.[3] In positive/negative campaign models, politicians have two options: revealing their own qualities (positive campaign) or downplaying the qualities of their opponents (negative campaign). This mirrors how politicians emphasize the importance of the issues where they have an advantage while downplaying the significance of other issues.

Skaperdas and Grofman (1995) present a model in which candidates allocate their resources

[3] I would like to thank Shintaro Miura for pointing out the similarities between these research topics.

to both positive and negative campaigns. Voters are categorized into two groups: supporters and undecided voters. The positive campaign aims to attract undecided voters to a sponsor, while the negative campaign seeks to decrease support for the opponent. Notably, negative campaigns incur a cost by potentially reducing support for the sponsor. In this framework, Skaperdas and Grofman (1995) demonstrate that a front-runner is more inclined to engage in a positive campaign and less likely to initiate a negative campaign. Furthermore, in a three-candidate scenario, the study reveals that negative campaigns are typically directed against the front-runner. Harrington Jr and Hess (1996) construct a model in which candidates vary along two dimensions: ideology and personal attributes. Subsequently, positive campaigns influence voters' perception of their own ideological stance, while negative campaigns impact the perception of the opponent's ideological position. Within this framework, the research indicates that the candidate perceived as stronger in terms of personal attributes is inclined to employ positive campaigns, whereas the other candidate is more likely to resort to negative campaigns.

These approaches are often characterized as black-box approaches because they assume a certain connection between voters' perceptions and candidates' campaigns. However, these approaches do not delve into modeling the mechanisms through which these campaigns convey information to voters or how voters rationally update their beliefs. Polborn and Yi (2006) addresses this gap by presenting a model that elucidates the transmission of information in such campaigns. In this model, positive campaigns unveil the candidate's own traits, while negative campaigns expose the characteristics of opponents. Drawing on these campaigns, voters rationally revise their beliefs about the candidates' traits. The study demonstrates a scenario in which negative campaigns efficiently convey information about both candidates, enabling voters to make more informed decisions. Specifically, the study highlights that negative campaigns are optimal when the sponsor lacks positive personal information or when opponents possess weak traits, thereby revealing the candidates' low quality to voters.

Finally, there exist studies exploring the role of the campaign in valence competition, wherein candidates can allocate resources to enhance their valence. These investigations delve into the impact of valence competition on party policy platforms, a question akin to the focus of Chapter 3 in the thesis. For instance, Ashworth and De Mesquita (2009) develops a model where candidates initially declare a platform and subsequently invest in valence through campaign spending. The findings reveal that candidates opt for divergent platforms to mitigate the costs associated with valence competition. Similarly, Zakharov (2009) constructs a model incorporating partisan and non-partisan voters. Non-partisan voters are influenced by both valence and policy platforms. The study demonstrates that candidates strategically adopt divergent policy platforms to avoid the expenses of campaign spending, with the degree of policy divergence contingent on the proportion of non-partisan voters.

Additionally, there are several literature that deal with campaign finance with special interest politics. For example, in their respective studies, Baron (1994) and Grossman and Helpman (1996) present a model where campaign budgets receive funding from special interest groups. Within these models, two voter types are identified: informed voters, influenced by policy platforms, and uninformed voters, influenced by campaign contributions. Consequently, candidates find themselves facing with a trade-off, as an increase in campaign contributions to attract uninformed voters necessitates a shift in platforms to align with special interest groups. These studies delve into how the ratio of uninformed voters and the effectiveness of campaigns impact policy platforms.

Despite the black-box approach taken in these papers, as elucidated in the discussion on positive/negative campaigning, numerous other studies delve into the information transmission aspect of campaign finance. For instance, Ashworth (2006) posit that advertising directly transmits information about the incumbent, but at the same time, advertisements are secured by the promise to fulfill favors for contributors, introducing a trade-off. Since voters are aware of this, advertisements transmit information about not only candidate quality but also the favors for contributors. Coate (2004) also constructs a similar-type model in which advertisements directly convey candidate quality, but this transmission requires favors for campaign contributors. The study demonstrates that campaign finance can lead to a Pareto improvement. In contrast, Prat (2002) assumes that advertisements are not directly informative, while campaign contributors can observe the type of candidates. The study suggests that campaign advertisements can indirectly provide information to voters.

In the context of these political campaign models, a body of literature delves into the informational aspect of political campaigns (Prat, 2002; Coate, 2004; Polborn and Yi, 2006; Ashworth, 2006). As mentioned at the outset of the introduction, the three essays in this thesis do not specifically address the informative dimension of issue selection. Nonetheless, it is crucial to note that this omission does not diminish the significance of the informative aspect in issue selection.

On the contrary, the informative facet of issue selection stands as a promising and valuable area for future research exploration.

The remaining chapters of the thesis are organized as follows: In Chapter 2, we delve into the interaction between media competition and parties' issue selection strategies, exploring their impact on the electoral outcome. Chapter 3 presents the issue selection model that addresses income inequality and the polarization of social ideologies, elucidating the interplay between parties' issue selection and its impact on the electoral outcome. Moving on to Chapter 4, we examine how parties utilize political misinformation—a mechanism akin to issue selection—for manipulating issue salience. Furthermore, we demonstrate how parties' dissemination of misinformation can lead to stricter law enforcement measures for crimes. Concluding the thesis, Chapter 5 summarizes each preceding chapter while addressing potential avenues for future research.

2 Issue selection, media competition, and polarization of salience

2.1 Introduction

A central part of political campaigns in modern democracies is how to attract voters' attention to issues in which the relevant party has an advantage. U.S. presidential elections offer good examples of the *issue selection strategies* of political parties. Generally, Democratic candidates have an advantage in domestic issues such as unemployment, education, inequality, civil rights and healthcare. Therefore, they tend to emphasize these issues in political campaigns. Clinton's *New Covenant* slogan in the 1992 election and Obama's strategy of emphasizing his new healthcare plan are typical examples. On the other hand, Republican candidates tend to have an advantage in national defense, undocumented immigration and religious issues. Bush's *war on terror* and strong opposition to same-sex marriage and gay rights in the 2004 election are typical examples. In addition, in the 2016 presidential election, Trump assigned a major role to immigration issues in his campaign. His xenophobic rhetoric toward immigrants captured voters' attention and made immigration policy one of the key issues during that election.

One important phenomenon in actual politics is that issue selection strategies seem to cause polarization of issue salience—the gap in voters' perception of what are important issues is growing during political campaigns. For example, in the 2004 U.S. presidential election, exit polls showed that there were large differences in issue salience between Bush and Kerry voters.[4] 86% of voters who answered that "*Terrorism*" was the most important issue were Bush voters, but only 14% were Kerry voters. On the other hand, 73% of voters who answered that "*Iraq*" was the most important issue were Kerry voters, but only 26% were Bush voters. Stroud (2011) provides some supportive evidence that the perception gap was growing during political campaigns. For example, Stroud (2011) shows that when comparing before/after the National Convention, voters who were exposed to Republicans campaign rhetoric were more likely to name "*Terrorism*" as the most important issue, but voters who were exposed to Democratic campaign were less likely to answer that "*Terrorism*" was the most important issue after the campaign. Intuitively, it is plausible that parties' issue selection strategies cause the polarization of issue salience among voters. However, the extant literature on parties' issue selection strategies does not indicate

[4] https://edition.cnn.com/ELECTION/2004/pages/results/states/US/P/00/epolls.0.html.

that issue selection causes polarization of issue salience.[5] In the extant literature, parties tend to emphasize different issues in which that each party has advantages (issue ownership) but do not cause polarization of salience.[6] Is there any theoretical possibility that issue selection causes polarization of salience weights and changes political outcomes?

In this study, we propose the possibility that media competition combined with parties' strategic issue selection causes polarization of issue salience among voters. This inference is based on the fact that there are severe differences in voters' choice of media outlets. For example, the Pew Research Center found that in the 2004 election, 70% of voters who obtained election news from Fox News voted for Bush. On the other hand, among voters who obtained their election news from CNN, 67% were Kerry voters, and only 26% were Bush voters.[7] These findings may suggest that voters who have different news sources see their salience weights increase in different directions, and this phenomenon may change voting behavior and electoral outcomes.

In the following analysis, we assume the following: (a) Voters are heterogeneous in their prior issue salience weights, i.e., voters have diversified political interests;[8] (b) Parties invest campaign spending to attract voters' attention; (c) Media outlets choose the ratio of issues that they broadcast to maximize their profit; and (d) Voters' salience weights change through media selection and viewing time, and they decide their votes based on these weights *after priming*. In this context, we first show that there is a possibility that the news coverage of media outlets becomes diverged, i.e., that each media outlet reports on entirely different issues. Next, we show that in equilibrium, media reporting combined with parties' strategic issue selection causes polarization of issue salience weights among voters. Finally, we show that polarization of salience weights among voters increases the vote share of the candidate with lower-quality policy proposals.

Since the "polarization of salience" is the central concept, we briefly discuss the meaning of this concept and the predictions derived from this phenomenon. In this article, voters are

[5] Examples of this stream of literature include Amorós and Puy (2013), Aragonès et al. (2015), Dragu and Fan (2016) and Denter (2020).

[6] There also exist situations in which parties' issue selection strategies show convergence. For example, see Amorós and Puy (2013).

[7] https://www.pewresearch.org/politics/2004/10/24/voters-impressed-with-campaign/.

[8] Pew Research Center (2021b) shows that people have diverse perceptions of the importance of the political agenda. The priority of the policy agenda is different in age, gender, race, and partisanship. Therefore, the assumption that voters are heterogeneous in their salience weights (priority of policy agenda) seems consistent with reality. Additionally, heterogeneity of issue salience across voters is a common assumption in the extant literature. See Amorós and Puy (2013), Aragonès et al. (2015), Dragu and Fan (2016), Denter (2020).

heterogeneous in their prior salience weights, but most voters do not have too much weight on one specific issue. In other words, voters decide their voting considering parties' policy proposals over several political issues if they are not affected by political campaigns and media reporting.[9] However, if the gap in voters' perception of what important issues are growing during political campaigns, voting behavior dramatically changes. For example, in the 2004 U.S. presidential election, if one group of voters perceives that *"Terrorism"* is the most important problem the nation faces through the political campaign, they would decide their voting based only on an evaluation of Bush administration's homeland security policy. On the other hand, if another voter group perceives that *"Iraq"* is the most important problem through the political campaign, they would decide their voting based only on the evaluation of military action in Iraq that had begun in 2003. In other words, different voter groups decide their voting based on different aspects of politics. Generally, parties should propose attractive, balanced policy platforms over multiple political issues, and a party that proposes a totally balanced platform could be supported. However, if polarization of salience occurs, voters are split and make their voting choice based on only one issue. Therefore, there is a possibility that the party that has an advantage in only one issue could win the race even if the party was unable to propose a platform of attractive, balanced policies from the viewpoint of multiple-issue politics.

This study makes three main contributions. First, unlike the existing literature on issue selection, this study incorporates media competition into an issue selection model and investigates the interactions of these factors. Second, from the viewpoint of media competition and issue selection, this study explains why the polarization of issue salience is seen in actual politics. Finally, this study shows one possible explanation for why an inferior party—a party that seems to have lower-quality policy proposals than its opponent—sometimes wins the race.

The current political competition model incorporates two types of approaches. The first is the analysis of party issue selection with endogenous issue salience weights. The *dominance principle* proposed by Riker (1993) and the *issue ownership theory* proposed by Petrocik (1996) are the pioneering contributions to the theory of parties' issue selection strategies. On the other hand, Amorós and Puy (2013), Aragonès et al. (2015), Dragu and Fan (2016) and Denter (2020) analyze issue selection strategies with endogenous issue weights using a game theoretic

[9] In the basic model discussed below, we assume that there are only two issues. However, we show that the main results can be sustained even if there are several political issues in section 2.4.2.

approach. Amorós and Puy (2013) and Dragu and Fan (2016) analyze how political parties choose the issues that they emphasize to attract voters' attention. On the other hand, Aragonès et al. (2015) develop an issue selection model that considers investment in policy quality. In their model, parties decide on the communication time spent to attract voters' attention and decide the amount of investment needed to improve their policy quality. Using this setting, Aragonès et al. (2015) reveal the conditions under which *issue stealing* occurs in political campaigns. Denter (2020) analyzes a model in which parties' campaign efforts affect both voters' attention (*priming*) and policy quality (*persuasion*) simultaneously. He reveals that considering both of these effects of campaign efforts can bridge extant theoretical and empirical research, i.e., can explain why *issue overlap* occurs in actual politics. The most important difference between the current study and the theoretical literature is that we incorporate media competition into an endogenous issue selection model. As a result, unlike past literature, we show that the salience of political issues becomes polarized among voters—a characteristic that has not been explained in the previous literature.[10]

The second approach is taken in a group of studies that analyze the effect of media competition on political outcomes. In the equilibrium derived in this study, media outlets choose the ratio of broadcast time dedicated to each issue, and this ratio diverges across media outlets, i.e., each media outlet reports on completely different issues. In this sense, the study relates to research that analyzes the effect of media bias. Examples are Mullainathan and Shleifer (2005), Baron (2006), Gentzkow and Shapiro (2006), Bernhardt et al. (2008), and Perego and Yuksel (2022), which analyze *fact bias*, and Strömberg (2001, 2004), George and Waldfogel (2003) and Duggan and Martinelli (2011), which analyze *issue bias*.[11] Some of these papers assume that media bias stems from the supply side (for example, Chan and Suen (2008)), but the current model assumes that media outlets have no political preferences or other types of bias. Therefore, the media bias that arises in this model can be interpreted as demand-driven bias. The papers most closely related to the current study are Strömberg (2001, 2004).Strömberg (2001, 2004) assumes that there are informed and uninformed voters and that news can affect informed voters' behavior. In this setting, Strömberg (2001, 2004) shows that media outlets increase coverage

[10] There are many empirical studies in this field. Examples are Petrocik et al. (2003), Sigelman and Buell Jr (2004), Damore (2005), Kaplan et al. (2006), Bélanger and Meguid (2008), Green and Hobolt (2008) and Green-Pedersen and Mortensen (2015).

[11] For a comprehensive survey of this field, see Prat and Strömberg (2013) and Gentzkow et al. (2015).

of news that is beneficial for the group of more informed voters. The current study is similar to Strömberg (2001, 2004) in that media outlets choose their news coverage to maximize profit. However, the current study assumes that there is no information asymmetry among voters. In the current model, the main role of media outlets is that the issues that they decide to broadcast affect viewers' (voters') salience weights.[12]

The remainder of this chapter proceeds as follows. In section 2.2, we develop a model of issue selection that incorporates media competition. In section 2.3, we show the equilibrium of media outlet competition and parties' issue selection strategies and reveal the characteristics of this model. In section 2.4, we extend the basic model and check the robustness of the results. In section 2.5, the conclusion, we discuss the empirical predictions derived from my model and directions for future research.

2.2 Model

Before entering into the details of the model, let us first survey the basic structure of this game. There are three types of players: political parties, media outlets and voters. First, there are two office-motivated parties L and R. The policy space is two-dimensional $\{1, 2\}$, and each party has a *policy proposal quality* that is exogenously given. The parties decide their allocation of campaign spending, which affects the voters' salience weights through media reporting.

Next, there are two media outlets. They choose their reporting ratio on two political issues to maximize profit. Their news reporting affects the voters' salience weights on each political issue, and the impact depends on the reporting ratio and the viewing time that each voter chooses. In the following, we call this media effect on voters' salience weights the *priming effect*.

Last, there is a continuum of voters, and they are differentiated by their prior salience weights. Voters each choose one media outlet and decide the viewing time of news reporting. Voters' salience weights are affected by this media reporting. After that, voters vote for the party that they prefer based on the policy proposal quality of each party and the salience weights *after priming*.

The electoral game has four stages. (1) Each party decides its allocation of campaign spending. (2) Two media outlets choose their reporting ratios on political issues. (3) Voters each

[12] Additionally, there is some empirical literature regarding the relationship between media and political campaigns; see Petrocik et al. (2003), Iyengar and Kinder (2010), and Stroud (2011).

choose one media outlet based on both parties' allocation of campaign spending and the voters' prior salience weights and decide their viewing time. (4) Voters each cast a ballot for one party based on the party's policy proposal quality and the voters' salience weights *after priming*. The following subsections explain the details of each type of player's behavior.

2.2.1 Political parties

Party $P \in \{L, R\}$ has a policy proposal quality on each issue that is exogenously determined and is denoted as (q_1^P, q_2^P), where $q_1^P, q_2^P > 0$.[13] As we will see in the following subsections, voters decide their votes based on the average policy proposal quality weighted by the salience of issues *after priming*. Without loss of generality, suppose that L has an advantage in issue 1 and R has an advantage in issue 2, i.e., $q_1^L > q_1^R, q_2^R > q_2^L$. Finally, suppose that L has a larger quality advantage than R, i.e., $q_1^L - q_1^R > q_2^R - q_2^L$. In that sense, L has higher-quality policy proposals, and R has lower-quality policy proposals.

Party P's objective is to maximize vote share through allocating campaign spending (C_1^P, C_2^P).[14] The total amount of campaign spending allocated to issue k by each party is denoted as $\mathbf{C}_k \equiv \Sigma_P C_k^P$. We assume that campaign spending has no immediate marginal costs, but parties are endowed with a use-it-or-lose-it budget. We assume that party L's constraint is $\mathbf{C}^L \equiv \Sigma_k C_k^L \leq I^L$, and $\mathbf{C}^R \equiv \Sigma_k C_k^R \leq I^R$, where $I^L, I^R > 0$. Those are the same type of settings as those of other issue selection literature such as Aragonès et al. (2015) and Denter (2020). In this setting, we allow the asymmetric campaign budget between parties. The maximization problem for each party is defined as follows.

[13] Aragonès et al. (2015) and Denter (2020) consider a situation in which parties invest their funding not only in attracting voters' attention but also in improving their policy proposal quality. In this model, we omit this process to focus on the relationship between the issue selection strategies of political parties and the behavior of media outlets.

[14] By using the assumption of aggregate uncertainty, it is also possible to assume that each parties' objective is to maximize the probability of winning, not vote share. However, the result is exactly the same. To avoid complications, we assume that parties are vote share maximizers. This type of simplification is common in the extant literature. For example, Dragu and Fan (2016) assume that parties' objective is vote share maximizing. Aragonès et al. (2015) assume that median voter's salience is uniformly distributed, which is essentially equal to my setting.

$$\max_{C_1^L, C_2^L} W^L(\mathbf{C}_1, \mathbf{C}_2, \mathbf{n}^A, \mathbf{n}^B) \quad s.t. \quad \Sigma_k C_k^L \leq I^L. \tag{2.1}$$

$$\max_{C_1^R, C_2^R} W^R(\mathbf{C}_1, \mathbf{C}_2, \mathbf{n}^A, \mathbf{n}^B) \quad s.t. \quad \Sigma_k C_k^R \leq I^R, \tag{2.2}$$

where W^P is the vote share of party P.[15] $\mathbf{n}^M = (n_1^M, n_2^M)$ is the reporting ratio of each media outlet $M \in \{A, B\}$, which will be explained in a later subsection.

In the extant issue selection literature, campaign spending (or campaign time) directly affects voters' salience weights.[16] Unlike the extant issue selection literature, however, this model assumes that parties' campaigns affect voters' media selection and indirectly change voters' salience weights through voters' consumption of media reporting.

2.2.2 Media outlets

Media outlet $M \in \{A, B\}$ reports the news about political issues 1 and 2. These outlets choose their reporting ratio for each issue (n_1^M, n_2^M), satisfying $n_1^M, n_2^M \in [0, 1]$ and $n_1^M + n_2^M = 1$.

In this model, voter i can choose one outlet $M \in \{A, B\}$ and decide her viewing time $t^*(\theta^i)$, where θ^i represents the salience weight of voter i for issue 1. The sales of each medium are defined as the total viewing time of voters who choose M. The total viewing time for media outlet M is defined as $T^M = \int_{\Theta^M} t^*(\theta^i) d\theta$, where Θ^M is the set of voters who choose media outlet M. The objective of each media outlet M is to maximize the total viewing time T^M by choosing the optimal reporting ratio (n_1^M, n_2^M).[17] In this setting, these media outlets are interpreted as TV broadcasters. Voters choose the broadcaster that they want to view and decide their amount of viewing time based on their prior salience weights for each political issue and the campaign communication of each party.

[15] We can use the alternative setting that the total amount of campaign budget is not constrained, but campaigns impose marginal costs for each party (e.g., $W^P - \Sigma_k (C_k^P)^2/2$). However, the main result does not change under this alternative setting, even though we need more conditions to obtain equilibrium. See Appendix A.1.

[16] For example, see Aragonès et al. (2015) and Denter (2020).

[17] In other words, we assume that total viewing time is equal to revenue and that media outlets' objective is to maximize their revenue. It is also possible to consider the cost of reporting in this model, but the main results do not change.

2.2.3 Voters

Voters are differentiated by the prior salience weight that they place on issue 1. The weight is denoted as $\theta^i \in \Theta$, which is uniformly distributed on $[0, 1]$. The prior salience weight on issue 2 can be defined as $1 - \theta^i$.[18]

Next, we examine how these voters choose a media outlet and their amount of viewing time. First, why do voters devote their time to viewing news about political policies? There is a continuum of voters, so it is not plausible that voters would spend their time and pay an opportunity cost to make better decisions in an election. As in the extant literature on media competition, such as Strömberg (2004) and Bernhardt et al. (2008), this model assumes that voters watch news to improve their private action. For example, more detailed news on the tax reform plans proposed by each party might help voters improve their private action regarding tax payments. Therefore, voters choose a media outlet and decide their viewing time based on their viewing utility function, which is different from the function that is used in voting. Voters choose one outlet each and their amount of viewing time $t^*(\theta^i)$ based on the following maximization problem.

$$\max_{M \in \{A,B\}, t \geq 0} u^i = \left\{ n_1^M[\theta^i + f_1(\mathbf{C})] + n_2^M[(1-\theta^i) + f_2(\mathbf{C})] \right\} t(\theta^i) - \frac{t(\theta^i)^2}{2}.^{19} \tag{2.3}$$

In the above, $f_k(\mathbf{C}), k \in \{1, 2\}$, $\mathbf{C} = (\mathbf{C}_1, \mathbf{C}_2)$ is a priming function of campaign spending. We assume that a priming function of campaign spending satisfies the following properties.

(A1) $\Sigma_k f_k(\mathbf{C}) = 1$ and $f_k(\mathbf{C}) \geq 0$. If $\mathbf{C}_k > 0$ then $f_k(\mathbf{C}) > 0$.

(A2) $f_k(\mathbf{C})$ is strictly increasing in $\mathbf{C}_k$ and strictly decreasing in $\mathbf{C}_l$, where $l \neq k$.

(A3) For any permutation π, $f_{\pi(k)}(\mathbf{C}) = f_k(\mathbf{C}_\pi)$, where $\mathbf{C}_\pi = (C_{\pi(1)}, C_{\pi(2)})$.[20]

Intuitively speaking, if the amount of campaign spending on one issue is relatively larger than

[18] If we assume that prior salience weight θ is affected by aggregate uncertainty, parties' objective function can be replaced with winning probability. More specifically, in this model, the median voter is $\theta^m = 1/2$. Therefore, if there is an aggregate uncertainty η that is uniformly distributed on $[-1/2, 1/2]$, the median voter's salience is uniformly distributed on $[0, 1]$. Under this setting, if parties' objective is to maximize winning probability, their objective functions are calculated by median voters' uniform salience distribution.

[19] The definition of the viewing utility function is based on the listening utility function defined in Bernhardt et al. (2008).

[20] We use this assumption extensively in a three-dimensional setting in section 2.4.2.

another issue, voters obtain more utility by watching the news reporting about that issue. The functional form and assumptions are based on Skaperdas (1996). (A3) is an anonymity assumption and requires that the value of $f_k(\mathbf{C})$ depends just on the amount of campaign spending on each issue. By (A1) and (A3), we have $f(\mathbf{C}_1, \mathbf{C}_2) = 1/2$ if $\mathbf{C}_1 = \mathbf{C}_2$. This type of function is used in the economics and political science literature (Tullock, 2001; Dixit, 1987; Baron, 1994), including the issue selection model (Dragu and Fan, 2016; Denter, 2020). There are a variety of possible functional forms (e.g., $(\Sigma_P C_k^P)^a/((\Sigma_P C_k^P)^a + (\Sigma_P C_l^P)^a), a > 0)$, but we do not specify them here. In the Appendix A.1, we use a specific form of contest success function to calculate an equilibrium in an endogenous campaign budget setting.

In this setting, voters choose media outlet $M \in \{A, B\}$ and set their viewing time t^* based on the prior salience θ^i. For example, if θ^i is large, a voter tends to choose the media outlet whose reporting ratio on issue 1 is higher. Additionally, if θ^i is large, she tends to devote more time to obtaining information about issue 1. This assumption depends on the *issue public hypothesis*, that is, that people seek out information on policy issues to which they attach a great deal of personal importance.[21] The same logic can be applied to parties' campaign spending. If relative campaign spending on issue 1 is greater than that on issue 2, voters tend to choose the media outlet whose reporting ratio on issue 1 is greater and devote more viewing time to news on issue 1. This can be interpreted as follows: when parties devote more campaign spending to emphasize a specific issue, voters perceive it as more important than other issues and that it might affect their lives. Hence, they devote their viewing time to that issue to obtain information and improve their private action.[22]

Next, we examine voting behavior. In this model, voters are sincere and vote for the party that they most prefer. Voter i chooses a party based on the following utility function.

$$v^i = s^i q_1 + (1 - s^i) q_2, \tag{2.4}$$

where s^i is voter i's salience *after priming* of issue 1, which is defined as

$$s^i = \max\{\min\{\theta^i + \beta(n_1^M - n_2^M)t^*(\theta^i), 1\}, 0\}, \tag{2.5}$$

[21] Iyengar et al. (2008) show that the evidence provides strong support for the *issue public hypothesis* rather than the *anticipated agreement hypothesis*.

[22] We assume that the effects of the prior salience weight and campaign spending are additive. However, we can also assume that these have multiplicative effects, but the main result does not change.

where $\beta \in (0,1)$ is the *priming effect of media reporting* and (n_1^M, n_2^M) are the reporting ratios of the media outlet that voter i chooses.[23] For example, if i chooses media outlet M with reporting ratio $(1,0)$, the salience after priming would be $s^i = \theta^i + \beta t^*(\theta^i)$.[24] Hence, if $t^*(\theta^i)$ and β become larger, the salience weight on issue 1 becomes larger. The opposite occurs when θ^i chooses the media outlet whose reporting ratio is $(0,1)$. For another example, if i chooses the media outlet with reporting ratio $(1/2, 1/2)$, the salience weight after priming is $s^i = \theta^i$. Since the media outlet's reporting is unbiased, voters' salience weights remain the same as they were before voters viewed the media reporting.

In this study, we focus on the pure strategy equilibrium. Here, we review the game structure. The electoral game has four stages.

- **Stage 1** Each party decides the allocation of campaign spending (C_1^P, C_2^P), which affects voters' salience weights through media reporting.
- **Stage 2** Two media outlets $M \in \{A, B\}$ choose their reporting ratios for each political issue $(n_1^M, n_2^M) \in [0,1]^2, n_1^M + n_2^M = 1$.
- **Stage 3** Voters i each choose one media outlet $M \in \{A, B\}$ and decide their viewing time $t^*(\theta^i)$.
- **Stage 4** Voters each vote for one party based on the party's policy quality (q_1^P, q_2^P) and the voters' salience weights *after priming*.

In the following, we solve this model by backward induction.

2.3 Analysis

2.3.1 Equilibrium of media competition

In this subsection, we investigate the equilibrium of media competition (Stage 2). First, we investigate voters' media choice (Stage 3). Voters choose outlet $M \in \{A, B\}$ based on the proposed reporting ratio (n_1^A, n_2^A) and (n_1^B, n_2^B). By equation (2.3), voters prefer (n_1^A, n_2^A) to (n_1^B, n_2^B) if

[23] This functional form is based on Bernhardt et al. (2008).

[24] For notational ease, in the following, we write (2.5) as $s^i = \theta^i + \beta(n_1^M - n_2^M)t^*(\theta^i)$, but note that the maximum of s^i is 1 and minimum is 0.

$$n_1^A\left[\theta^i + f_1(\mathbf{C})\right] + n_2^A\left[(1-\theta^i) + f_2(\mathbf{C})\right] > n_1^B\left[\theta^i + f_1(\mathbf{C})\right] + n_2^B\left[(1-\theta^i) + f_2(\mathbf{C})\right]. \tag{2.6}$$

By using the fact that $n_2^A = 1 - n_1^A$ and $f_1(\mathbf{C}) = 1 - f_2(\mathbf{C})$, the left-hand side of (2.6) can be rewritten as

$$\begin{aligned} & n_1^A\left[\theta^i + f_1(\mathbf{C})\right] + n_2^A\left[(1-\theta^i) + f_2(\mathbf{C})\right] \\ & \quad \Leftrightarrow n_1^A[\theta^i + 1 - f_2(\mathbf{C})] + (1 - n_1^A)[(1-\theta^i) + f_2(\mathbf{C})] \\ & \quad \Leftrightarrow 2n_1^A[\theta^i - f_2(\mathbf{C})] + (1-\theta^i) + f_2(\mathbf{C}). \end{aligned} \tag{2.7}$$

The right-hand side of (2.6) can be arranged in the same manner. Therefore, equation (2.6) can be rewritten as

$$\begin{aligned} & 2n_1^A[\theta^i - f_2(\mathbf{C})] + (1-\theta^i) + f_2(\mathbf{C}) > 2n_1^B[\theta^i - f_2(\mathbf{C})] + (1-\theta^i) + f_2(\mathbf{C}) \\ & \quad \Leftrightarrow (n_1^A - n_1^B)[\theta^i - f_2(\mathbf{C})] > 0. \end{aligned} \tag{2.8}$$

Hence, the condition under which voter i prefers A to B can be written as

$$\theta^i > f_2(\mathbf{C}), \quad \text{if } n_1^A - n_1^B > 0 \quad (\Leftrightarrow n_2^A - n_2^B < 0). \tag{2.9}$$

$$\theta^i < f_2(\mathbf{C}), \quad \text{if } n_1^A - n_1^B < 0 \quad (\Leftrightarrow n_2^A - n_2^B > 0). \tag{2.10}$$

This means that parties' campaign spending affects voters' choice of media outlet. For example, if A chooses a higher reporting ratio on issue 1 than B, voters whose salience weight is higher than $f_2(\mathbf{C})$ choose A and vice versa. Additionally, if $f_2(\mathbf{C})$ is large, i.e., the total campaign spending on issue 2 is larger than that on issue 1, more voters prefer the outlet that reports news on issue 2 and vice versa. In the following, assume that if voters are indifferent to both media outlets, a fair coin is flipped so that they choose one of each media outlet with a probability one-half.

Next, we investigate voters' decisions about their viewing time. As explained earlier, voters' utility regarding viewing news is determined by equation (2.3). This satisfies the first- and second-order conditions with respect to t, so differentiating this utility function by t leads to

$$t^*(\theta^i) = n_1^M \left[\theta^i + f_1(\mathbf{C})\right] + n_2^M \left[(1-\theta^i) + f_2(\mathbf{C})\right]. \tag{2.11}$$

This means that if the media outlet provides a higher reporting ratio for the issue voters have interest, they devote more time to viewing the news. Additionally, if the media outlet provides a higher reporting ratio for the issue emphasized by political parties, they devote more time to viewing the news.

These calculations yield the first main result of this section.

Proposition 2.1. In media competition (Stage 2), there are three types of unique Nash equilibria.
Case S: One media outlet chooses $(n_1, n_2) = (1, 0)$ and another chooses $(0, 1)$ if $\frac{\sqrt{15}-3}{2} \leq f_1(\mathbf{C}) \leq \frac{5-\sqrt{15}}{2}$.
Case B1: Both media outlets choose $(n_1, n_2) = (1, 0)$ if $\frac{5-\sqrt{15}}{2} < f_1(\mathbf{C})$.
Case B2: Both media outlets choose $(n_1, n_2) = (0, 1)$ if $f_1(\mathbf{C}) < \frac{\sqrt{15}-3}{2}$.

In the above proposition, S means *Split* and *B1* and *B2* mean *Biased toward issue* 1 *or* 2. The formal proofs of the following propositions are all in Appendix B. If the campaign spending exerted on an issue is much larger than that exerted on another issue, i.e., $f_1(\mathbf{C})$ or $f_2(\mathbf{C})$ is larger/smaller than the cutoff points, both parties choose the same issue to report. However, if the difference in campaign spending exerted on each issue is not large, both media outlets choose biased reporting on a different issue.

Figure 2.1 shows an example of the equilibrium in *Case S*, where $\frac{\sqrt{15}-3}{2} \leq f_1(\mathbf{C}) \leq \frac{5-\sqrt{15}}{2}$. The horizontal line depicts the prior salience weight of voters, and the vertical line depicts the viewing time of each θ^i. In Figure 2.1, A chooses $(1, 0)$, and B chooses $(0, 1)$. Since the cutoff point for which media outlet voter θ^i chooses is $f_2(\mathbf{C})$, voters who satisfy $\theta^i > f_2(\mathbf{C})$ choose A, and voters who satisfy $\theta^i < f_2(\mathbf{C})$ choose B. Additionally, the viewing time of the voters is determined by $t^*(\theta^i)$. Hence, the total viewing time of A is determined as the shaded region of Figure 2.1. For example, if $\theta^i = 1$, the viewing time is determined as $1 + f_1(\mathbf{C})$. In the same manner, the total viewing time for B is determined as the bright region of Figure 2.1. Note that

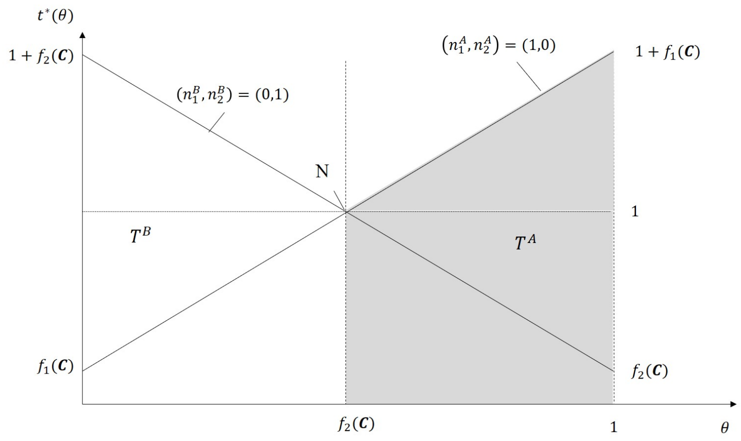


Figure 2.1: Equilibrium of Media Outlets in *Case S*

T^A, T^B is also changed by the relative campaign spending exerted on each issue. For example, if $f_1(\mathbf{C})$ increases, the total viewing time for the outlet that chooses a high reporting ratio on issue 1 increases.

In the situation in Figure 2.1, do both media outlets have an incentive to deviate to the other strategy? Let us consider the case of B. If B decreases n_2^B and increases n_1^B, the slope of the line would decrease while the center point N is fixed. Since the cutoff point is unchanged unless $n_1^B = 1$, T^B decreases. However, in the case where B diverges to $(1, 0)$, there is a possibility that B has an incentive to deviate. If B chooses $(1, 0)$, all voters have no choice but to choose a media outlet whose reporting ratio is $(1, 0)$. Hence, the total viewing time is divided by one-half among the two outlets. In this case, if the total viewing time is larger than the previous payoff, B has an incentive to deviate to $(1, 0)$, which would result in equilibrium. Intuitively, this case may arise when parties' campaign spending on issue 1 is sufficiently large. However, as far as the condition $\frac{\sqrt{15}-3}{2} \leq f_1(\mathbf{C}) \leq \frac{5-\sqrt{15}}{2}$ holds, this case does not arise.

The important point is that even when media outlets do not have ideological bias or advantages in reporting specific issues, divergence of issue coverage may occur. This is because if media choose biased reporting on an issue, voters who initially pay more attention to this issue tend to devote more viewing time to those outlets. Unlike in the *median voter theorem*, in which the votes of all are equal, in this model, the media outlets' strategy could be altered since the viewing time of each voter is not equal. Under media competition, both media outlets tend to attract voters who place a large salience weight on an issue; thus, divergence of issue coverage occurs.

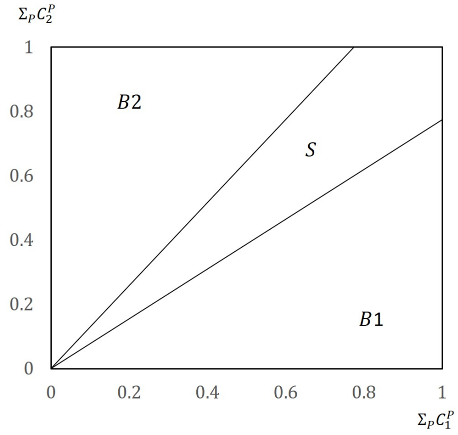


Figure 2.2: Condition of Divergence/Convergence in Media Competition

Figure 2.2 shows the relationship between campaign spending for each issue and equilibrium in media competition. In this setting, we assume that $f_k(\mathbf{C}) = \frac{\Sigma_P C_k^P}{\Sigma_P C_k^P + \Sigma_P C_l^P}$. As Proposition 2.1 states, if $f_1(\mathbf{C})$ is in a medium position, i.e., $\Sigma_P C_1^P$ is not so different from $\Sigma_P C_2^P$, divergence of issue coverage occurs. In a later section, we extend the model where voters have an ideological preference toward one of each political party and show that voters' ideological preference makes divergence equilibrium (*Case S*) more robust.

2.3.2 Equilibrium of issue selection

In this subsection, we investigate the equilibrium of each party's campaign spending (Stage 1). First, we consider voters' behavior. As explained in section 2.2, voters cast their ballots based on the utility function. Hence, voter i prefers L to R if

$$\begin{aligned} s^i q_1^L + (1-s^i) q_2^L &> s^i q_1^R + (1-s^i) q_2^R \\ \Leftrightarrow s^i &> \frac{-\Delta q_2}{\Delta q_1 - \Delta q_2} = q^*. \end{aligned} \tag{2.12}$$

In the above equation, $\Delta q_1 = q_1^L - q_1^R$ and $\Delta q_2 = q_2^L - q_2^R$. Since $q_1^L - q_1^R > q_2^R - q_2^L \Leftrightarrow \Delta q_1 > -\Delta q_2$, $0 < q^* < 1/2$. Here, $1 - q^*$ represents a relative policy quality advantage for L, which we will explain later. In the following, assume that if voter i is indifferent to both proposals, a fair coin is flipped so that her probability of voting for each party is one-half.

As a benchmark, first consider the case in which both media outlets choose unbiased re-

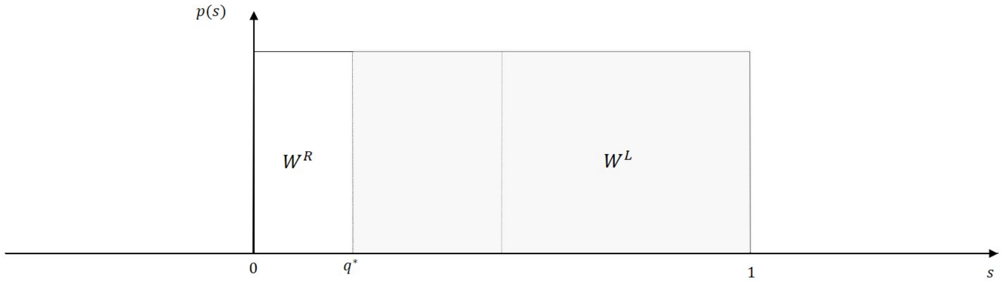


Figure 2.3: Equilibrium in the Unbiased Reporting Case

porting, $(1/2, 1/2)$. Actually, as stated in Proposition 2.1, the unbiased reporting case cannot be an equilibrium in Stage 2. However, considering the case is helpful for understanding the characteristics of the biased reporting equilibrium.

Suppose that both media outlets' reporting ratios are exogenously determined and that they choose $(1/2, 1/2)$. In this case, $s^i = \theta^i + \beta(n_1^M - n_2^M)t^*(\theta^i) = \theta^i$ because $n_1^M - n_2^M = 0$ regardless of which outlet voters choose. Since $s^i = \theta^i$ is uniformly distributed on $[0, 1]$, if both media outlets' reporting ratios are exogenously determined and that they choose $(\frac{1}{2}, \frac{1}{2})$, then $W^L = Pr\{s^i > q^*\} = 1 - q^* > \frac{1}{2}$ and $W^R = Pr\{s^i < q^*\} = q^* < \frac{1}{2}$.

Figure 2.3 shows an example of the equilibrium in the unbiased reporting case. This graph describes the distribution of s^i. Since s^i is uniformly distributed on $[0, 1]$ the vote share of L is described by the shaded region of Figure 2.3. The implication is simple. If biased reporting does not exist and voters decide their vote based on prior salience weights, the vote share of the party that has the advantage in policy proposal quality is larger than that of the opponent party. Here, the vote share for each party is determined by q^*. More specifically, $1 - q^*$ represents a relative policy quality advantage for L and q^* represents a relative policy quality advantage for R.

Next, we investigate the conditions for the existence of equilibria given each case in Stage 2: *Case S*, *Case B1* and *Case B2*.

Let us consider *Case S*. Without loss of generality, we suppose that A chooses $(1, 0)$ and B chooses $(0, 1)$. We investigate voters' media choice first. As discussed in the previous section, which media outlet θ^i chooses depends on the cutoff point $f_2(\mathbf{C})$. If $\theta^i > f_2(\mathbf{C})$, she chooses A. Then, by equations (2.5) and (2.11), the salience weight of voter i after priming would be

$$s^i = \theta^i + \beta t^*(\theta^i) = (1+\beta)\theta^i + \beta f_1(\mathbf{C}). \tag{2.13}$$

Conversely, if $\theta^i < f_2(\mathbf{C})$, she chooses B. In this case, the salience of θ^i after priming would be

$$s^i = \theta^i - \beta t^*(\theta^i) = (1+\beta)\theta^i - \beta f_2(\mathbf{C}) - \beta. \tag{2.14}$$

Since θ^i is uniformly distributed on $[0, 1]$, the voter's salience weight after priming is distributed on $[0, f_2(\mathbf{C}) - \beta)$ and $(f_2(\mathbf{C}) + \beta, 1]$. Figure 2.4 describes the distribution of s^i.[25] Interestingly, the distribution of θ^i is divided at $f_2(\mathbf{C})$. This divided distribution is because if $\theta^i > f_2(\mathbf{C})$, she chooses media reporting $(1, 0)$, and she is inclined to view issue 1 as more salient. However, if $\theta^i < f_2(\mathbf{C})$, she chooses media reporting $(0, 1)$, and is inclined to view issue 2 as more salient. Hence, if media outlets choose biased reporting on different issues, the distribution of voters' salience weight is polarized. We call this phenomenon the *polarization of salience* among voters.

Next, let us consider *Case B1.* Suppose that both media outlets choose $(n_1, n_2) = (1, 0)$. By equations (2.5) and (2.11), the salience weight of voter i after priming would be

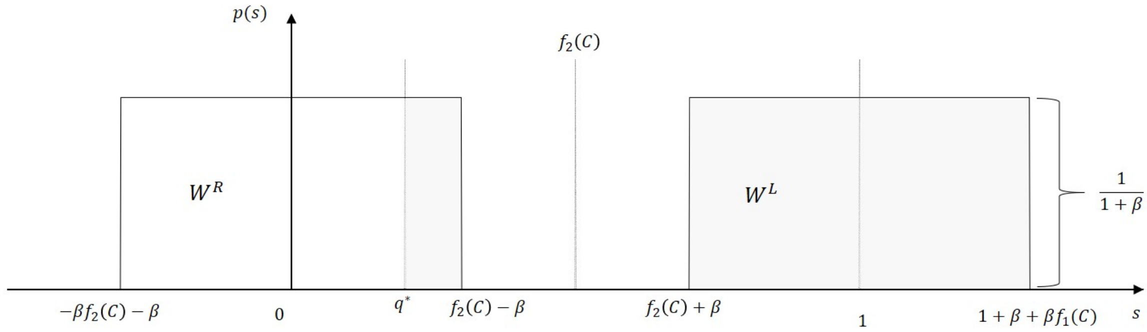
$$s^i = \theta^i + \beta t^*(\theta^i) = (1+\beta)\theta^i + \beta f_1(\mathbf{C}). \tag{2.15}$$

Next, let us consider *Case B2.* Suppose that both media outlets choose $(n_1, n_2) = (0, 1)$. As in *Case B1*, the salience weight of voters after priming would be

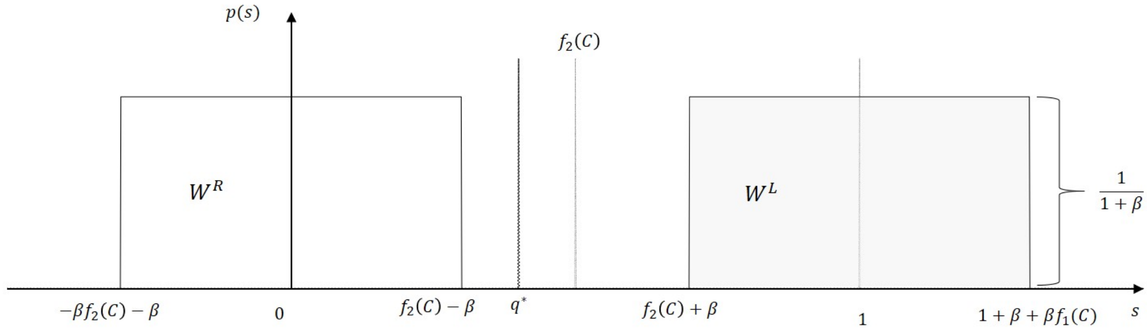
$$s^i = \theta^i - \beta t^*(\theta^i) = (1+\beta)\theta^i - \beta f_2(\mathbf{C}) - \beta. \tag{2.16}$$

Since θ^i is uniformly distributed on $[0, 1]$, the distribution of s^i can be described as in Figure 2.5. The upper panel depicts *Case B1*, and the lower panel depicts *Case B2.* If both outlets choose $(n_1, n_2) = (1, 0)$, the vote share of L would increase because this biased reporting makes all voters inclined to view issue 1 as more salient. On the other hand, if both outlets choose $(n_1, n_2) = (0, 1)$, the vote share of R would increase because this biased reporting makes all

[25] Precisely speaking, s^i does not exceed 1 or fall below 0, as described in Figure 2.4. However, we describe the distribution of s^i as if these outcomes were possible because it is more intuitive and helpful to calculate the vote share of each party in the following discussion.



(a) $q^* < f_2(\mathbf{C}) - \beta$



(b) $q^* \geq f_2(\mathbf{C}) - \beta$

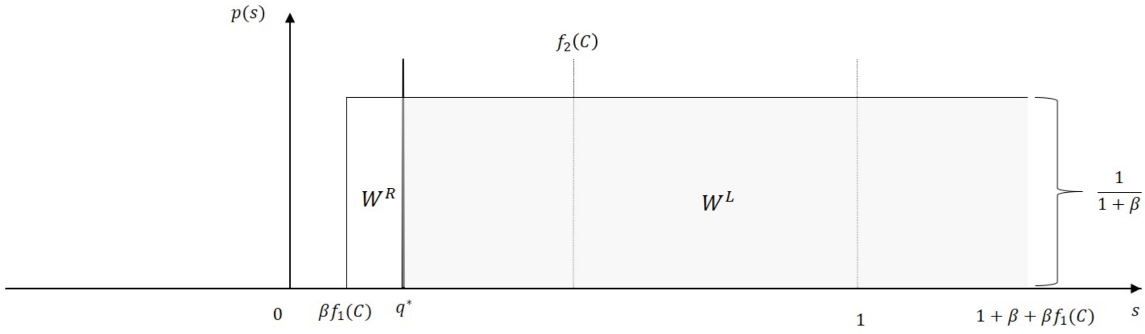
Figure 2.4: Distribution of Voters' Salience Weight in *Case S*

voters inclined to view issue 2, on which R has an advantage, as more salient.

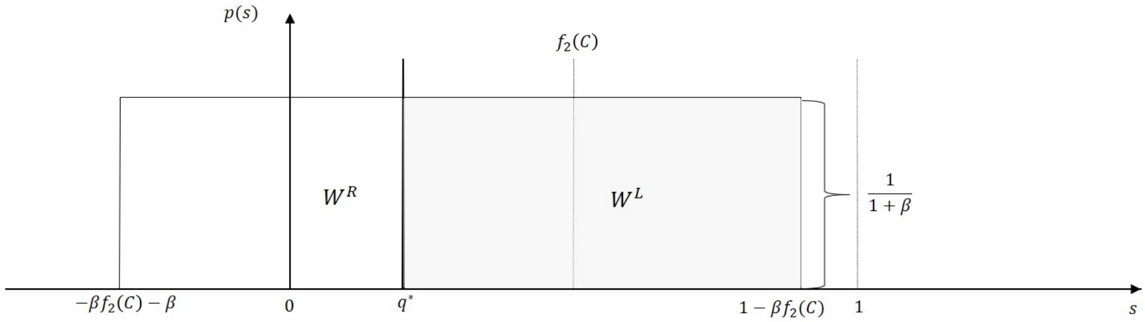
Considering the above analysis, we solve the first stage of the game. The result is straightforward: L devotes all campaign spending to issue 1, and R devotes all campaign spending to issue 2 because both parties have an incentive to increase the salience weight of their advantageous issue.[26] Since the constraints of campaign spending for L is $\Sigma_k C_k^L \leq I^L$ and that for R is $\Sigma_k C_k^R \leq I^R$, party L chooses $(C_1^{L*}, C_2^{L*}) = (I^L, 0)$ and R chooses $(C_1^{R*}, C_2^{R*}) = (0, I^R)$. This constraint means that in equilibrium, $f_1(I^L, I^R) = 1 - f_2(I^L, I^R)$ holds. In the following, we write $f_1(I^L, I^R) = \alpha$. By the definition of $f_k(\mathbf{C})$, if $I^L > I^R$, then $f_1(I^L, I^R) > 1/2$ and vice versa. Therefore, α reflects a relative campaign budget of party L. In addition, the size of α is also affected by the shape of $f_k(\mathbf{C})$. From the above analysis, we obtain the equilibrium of this game.

Proposition 2.2. In a subgame perfect Nash equilibrium, L chooses $(C_1^{L*}, C_2^{L*}) = (I^L, 0)$ and R chooses $(C_1^{R*}, C_2^{R*}) = (0, I^R)$. In stage 2, there are three types of unique equilibria.
(i) One media outlet chooses $(n_1, n_2) = (1, 0)$ and another chooses $(0, 1)$ if $\frac{\sqrt{15}-3}{2} \leq \alpha \leq \frac{5-\sqrt{15}}{2}$.

[26]The result is the same in the endogenous budget setting. See Appendix A.1.



(a) *Case B1*: Both Outlets Choose $(1, 0)$



(b) *Case B2*: Both Outlets Choose $(0, 1)$

Figure 2.5: Distribution of Voter's Salience Weight in *Case B1* and *Case B2*

(ii) Both media outlets choose $(n_1, n_2) = (1, 0)$ if $\frac{5-\sqrt{15}}{2} < \alpha$.

(iii) Both media outlets choose $(n_1, n_2) = (0, 1)$ if $\alpha < \frac{\sqrt{15}-3}{2}$.

Therefore, if the relative campaign budget difference is not so large, divergence of issue coverage occurs in media competition (*Case S*).[27] In this equilibrium, voters who have higher prior salience for issue 1 choose the media outlet that reports issue 1, and voters who have higher prior salience for issue 2 choose the media outlet that reports issue 2. As a result, polarization of salience weights occurs, as shown in Figure 2.4.

Interestingly, in this equilibrium, the vote share of party R increases over that in the case of unbiased reporting. This fact is summarized in the following proposition.

Proposition 2.3. Suppose that $\alpha < 1 - q^*$ holds. In a subgame perfect Nash equilibrium where *Case S* occurs in stage 2, the vote share of R, i.e., the party with lower-quality policy proposals, increases over the level in the unbiased reporting case.

[27] In actual politics, the campaign budgets between two parties are not so different, so *Case S* seems to be a plausible equilibrium. For example, Aragonès et al. (2015) point out that the budget difference tends to be small between two parties by using the fact that Republicans spent \$83.5 million on issue ads, and Democrats \$78.4 million in the 1999-2000 campaign.

First, we briefly discuss the meaning of the assumption $\alpha < 1 - q^*$. As discussed previously, $1 - q^*$ is a vote share of L if there is no priming effect. Therefore, this represents a relative policy quality advantage of L compared to R. On the other hand, α reflects a relative total campaign budget advantage of L. Therefore, $\alpha < 1 - q^*$ requires that the campaign budget advantage of L be lower than the policy quality advantage. Note that this condition does not require that R has an advantage in its campaign budget, i.e., $\alpha < 1/2$. Therefore, it is possible that W^R would increase through the priming effect even when R has a disadvantage not only in policy qualities but also in campaign budgets.

Next, we will give the intuition of Proposition 2.3 by using Figure 2.3 and Figure 2.4. In each equilibrium in Proposition 2.2, both parties devote all campaign budgets to different issues. Hence, in equilibrium, $f_2(\mathbf{C}) = 1 - \alpha$ holds. If α satisfies $\frac{\sqrt{15}-3}{2} \leq \alpha \leq \frac{5-\sqrt{15}}{2}$, the distribution of θ^i is divided at $1 - \alpha$, and the distribution changes from Figure 2.3 to Figure 2.4. Therefore, voters who satisfy $\theta^i > 1 - \alpha$ are inclined to view issue 1 as more salient, and voters who satisfy $\theta^i < 1 - \alpha$ are inclined to view issue 2 as more salient. However, polarization toward issue 1 does not change W^L. Since L has a quality advantage over R, when $\theta^i > 1 - \alpha$, she votes for L even before being affected by campaign and media reporting (since $\alpha < 1 - q^* \Leftrightarrow q^* < 1 - \alpha$ holds, voter i who satisfies $\theta^i > 1 - \alpha$ votes for L before priming). This means that even if voters' salience weights become more inclined toward issue 1 by priming, they would not change their voting behavior. On the other hand, polarization toward issue 2 increases W^R. Since R has a disadvantage in policy proposal quality, voters who are inclined toward issue 2 include voters who vote for L before priming. As a result, when voters are inclined by priming to view issue 2 as more salient, the number of voters who change their voting behavior from L to R increases.[28] In a later section, we show that these results are robust in a broader setting.

In summary, Proposition 2.2 shows that if the relative campaign budget is not very different, media reporting must be polarized, i.e., each media outlet reports on completely different issues than its competitor. This divergence of issue coverage in media competition also leads to polarization of salience weights among voters. To the best of my knowledge, this conclusion cannot be found in the previous literature on issue selection strategies. In addition, Proposition 2.3 shows that polarization of salience weights among voters leads to an increase in the vote

[28] As mentioned in Section 2.2.3, we can integrate aggregate uncertainty to transform both parties into maximizers of winning probability. In this context, the interpretation of Proposition 2.3 shifts to the notion that the polarization of issue salience has the potential to enhance the winning probability of the inferior party.

share of the inferior party, i.e., the party that has lower-quality policy proposals. This result shows one possible explanation for why an inferior candidate—a politician who seems to have lower-quality policy proposals than those of her opponent—sometimes wins the race.

Finally, we briefly discuss how political campaigns and media competition solely affect the polarization of salience. First, it is impossible that political campaigns solely cause polarization of salience. The intuitive reason is that media competition has a crucial role in allowing voters to focus on information that is congruent with their prior beliefs. We discuss this point in Appendix A.2 by using a simple direct political communication setting. On the other hand, even if there is no political campaign stage, divergence in media competition (*Case S*) occurs. More specifically, if there is no political campaign, *Case S* becomes a unique equilibrium in the media competition stage, and voters are primed toward the direction in which their prior salience weights are relatively higher.

If media competition solely causes polarization of salience, why do we need to consider the combination of political communication and media competition? There are three reasons. First, as stated in Proposition 2.2, political campaigns have a decisive role in determining whether convergence/divergence of issue coverage occurs in media competition. For example, if there is a large asymmetry in the campaign budget (α), convergence to one political issue occurs (*Case B1, B2*) instead of divergence (*Case S*). Therefore, to understand the condition in which polarization of voters' salience occurs, investigating the combination between political campaigns and media competition is important. Second, since political campaigns exert a multiplicative effect on the polarization of salience, if there is no political communication stage, the distance of polarization becomes small. We discuss this point in Appendix A.3. Third, when there are more than two issues, political campaigns have a decisive role in which issue each media outlet chooses to report. In other words, political campaigns determine in which direction the polarization of salience occurs. We will discuss this point in Section 2.4.2.

2.4 Extensions

2.4.1 Ideological heterogeneity

In the previous sections, the model assumed that voters are heterogeneous in relative salience weights, but they do not have ideological preference. However, in the actual world, voters are heterogeneous not only in salience weights but also in their ideological preferences. How does heterogeneous ideological preference affect the previous results? In this subsection, we introduce the model where voters have an ideological preference toward one of the two parties. As a result, we show that when voters have biased preferences, divergence in media competition (*Case S*) would become a more robust equilibrium. Additionally, we show that polarization of salience occurs as in the previous section.

The basic setting is the same as in the previous sections except for voters' preference. There are two political parties $P \in \{L, R\}$, two media outlets $M \in \{A, B\}$, and two political issues $k \in \{1, 2\}$. Suppose that there are two groups of voters. Group g^L is biased toward party L and group g^R is biased toward R. To simplify the discussion, suppose that the size of each group is the same and 1/2. The salience weight of each voter i in group $P \in \{L, R\}$ toward issue 1 is defined as θ^{iP} and assumed to be uniformly distributed on $[0, 1]$. The voter i in g^L prefers L to R if

$$s^{iL}q_1^L + (1 - s^{iL})q_2^L + b > s^{iL}q_1^R + (1 - s^{iL})q_2^R, \tag{2.17}$$

where $b > 0$ is a bias parameter toward L. s^{iP} is the salience weight after priming and is defined as in the definition (2.5). The quality of the policies of each party are also defined as in the previous sections. This equation can be rewritten as

$$s^{iL} > \frac{-\Delta q_2 - b}{\Delta q_1 - \Delta q_2} = q^{L*}. \tag{2.18}$$

Similarly, voter i in g^R prefers L to R if

$$s^{iR}q_1^L + (1 - s^{iR})q_2^L > s^{iR}q_1^R + (1 - s^{iR})q_2^R + b, \tag{2.19}$$

where $b > 0$ is a bias parameter toward R. To simplify the following discussion, we suppose bias parameter b is symmetric in each group. This equation can be rewritten as

$$s^{iR} > \frac{-\Delta q_2 + b}{\Delta q_1 - \Delta q_2} = q^{R*}. \tag{2.20}$$

Therefore, in this setting, each group of voters has a different cutoff point: q^{L*} and q^{R*}. Additionally, note that $q^{L*} < q^* < q^{R*}$ holds.

Next, we assume that bias parameter b affects not only voting but also the choice of media outlet and viewing time. Let us assume that voters in g^L obtain more utility by viewing the news about advantageous issues for L (i.e., issue 1). This means that voters' ideological preference leads voters to perceive that the ideologically preferred party's advantageous issue is more relevant to their private lives. Then, the viewing utility of voter i in g^L can be defined as

$$\max_{M\in\{A,B\},t\geq 0} u^{iL} = \left\{n_1^M[\theta^{iL} + f_1(\mathbf{C}) + b] + n_2^M[(1-\theta^{iL}) + f_2(\mathbf{C})]\right\} t(\theta^{iL}) - \frac{t(\theta^{iL})^2}{2}. \tag{2.21}$$

According to the same logic, the viewing utility of voter i in g^R can be written as

$$\max_{M\in\{A,B\},t\geq 0} u^{iR} = \left\{n_1^M[\theta^{iR} + f_1(\mathbf{C})] + n_2^M[(1-\theta^{iR}) + f_2(\mathbf{C}) + b]\right\} t(\theta^{iR}) - \frac{t(\theta^{iR})^2}{2}. \tag{2.22}$$

Next, we will analyze voters' media choice discussed in section 2.3.1. According to the same logic as that of section 2.3.1., the condition in which voter i in g^L prefers media outlet A to B can be written as

$$\theta^{iL} > f_2(\mathbf{C}) - b/2, \quad \text{if } n_1^A - n_1^B > 0. \tag{2.23}$$

$$\theta^{iL} < f_2(\mathbf{C}) - b/2, \quad \text{if } n_1^A - n_1^B < 0. \tag{2.24}$$

The main difference is that the cutoff point for choosing the media outlet changes from $f_2(\mathbf{C})$ to $f_2(\mathbf{C}) - b/2$. Therefore, in g^L, more voters tend to choose a media outlet that reports issue 1. According to the same logic, the condition in which voter i in g^R prefers media outlet A to B can be written as

$$\theta^{iR} > f_2(\mathbf{C}) + b/2, \quad \text{if } n_1^A - n_1^B > 0. \tag{2.25}$$

$$\theta^{iR} < f_2(\mathbf{C}) + b/2, \quad \text{if } n_1^A - n_1^B < 0. \tag{2.26}$$

Since the cutoff point changes from $f_2(\mathbf{C})$ to $f_2(\mathbf{C}) + b/2$, in g^R, more voters tend to choose a media outlet that reports issue 2.

In this setting, the modified version of Proposition 2.1 can be obtained as follows.

Proposition 2.4. In media competition (Stage 2), there are three types of unique Nash equilibria.

Case S: One outlet chooses $(n_1, n_2) = (1, 0)$ and another outlet chooses $(0, 1)$ if $\frac{\sqrt{15+8b}-(3+b)}{2} \leq f_1(\mathbf{C}) \leq \frac{5+b-\sqrt{15+8b}}{2}$.

Case B1: Both media outlets choose $(n_1, n_2) = (1, 0)$ if $\frac{5+b-\sqrt{15+8b}}{2} < f_1(\mathbf{C})$.

Case B2: Both media outlets choose $(n_1, n_2) = (0, 1)$ if $f_1(\mathbf{C}) < \frac{\sqrt{15+8b}-(3+b)}{2}$.

The difference from Proposition 2.1 is the cutoff points for the divergence/convergence of issue coverage. If $b = 0$, the cutoff points are the same as those in Proposition 2.1. However, if b increases, the lower cutoff point $(\frac{\sqrt{15+8b}-(3+b)}{2})$ decreases and the upper cutoff point $(\frac{5+b-\sqrt{15+8b}}{2})$ increases.[29] Therefore, if biased parameter b increases, the divergence of issue coverage in media competition (*Case S*) becomes a more robust equilibrium. The intuition is simple. If voters have a biased preference toward an issue in which their preferred party has an advantage, they devote more viewing time to this issue. Therefore, even if there is some difference between the campaign spending between each issue, both media outlets prefer to focus on a different issue from its rival and extract more viewing time from ideologically biased voters.

Next, as a benchmark, we calculate the vote share for each party if there is no biased reporting. Suppose that each media outlet exogenously chooses $(n_1^M, n_2^M) = (1/2, 1/2)$. Then, according to the same logic as in section 2.3.2, $s^{iP} = \theta^{iP}$ holds. Therefore, in g^L, voters who satisfy $q^{L*} < \theta^i$ votes for L and in g^R, voters who satisfy $q^{R*} < \theta^i$ votes for L. Since θ^{iP} is uniformly distributed on $[0, 1]$ in each group and the size of each group is $1/2$, the vote share for party L can be calculated as

$$W^L = \frac{1}{2}(1 - q^{L*}) + \frac{1}{2}(1 - q^{R*}) = 1 - \frac{1}{2}(\frac{-\Delta q_2 - b}{\Delta q_1 - \Delta q_2} + \frac{-\Delta q_2 + b}{\Delta q_1 - \Delta q_2}) = 1 - q^*. \tag{2.27}$$

Therefore, as long as the bias parameter b is symmetric in each group, the vote share for L is still $1 - q^* > 1/2$ and that for R is $q^* < 1/2$.

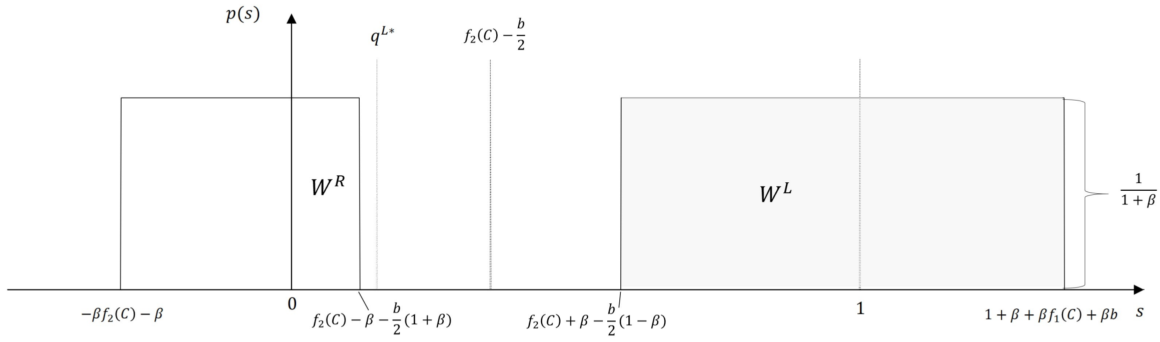
[29] By differentiating these cutoff points with respect to b, it is straightforward to check that $\frac{\sqrt{15+8b}-(3+b)}{2}$ is a decreasing and $\frac{5+b-\sqrt{15+8b}}{2}$ is an increasing function of b as far as $b > 0$ holds.

Next, we investigate the parties' strategy in Stage 1. Note that even in this setting, party L still has an advantage in issue 1, and party R still has an advantage in issue 2. Then, even though the cutoff points are different in each group (q^{L*} in g^L and q^{R*} in g^R), they have the same incentive as in the previous model: L has an incentive to attract voters toward issue 1, and R has an incentive to attract voters toward issue 2. Therefore, they devote all campaign spending to the advantageous issue, as in Proposition 2.2. This spending means that in equilibrium, $f_1(\mathbf{C}) = \alpha$ holds. Therefore, as far as α satisfies $\frac{5+b-\sqrt{15+8b}}{2} \leq \alpha \leq \frac{\sqrt{15+8b}-(3+b)}{2}$, the divergence of issue coverage in media competition (*Case S*) occurs. Formally, the modified version of Proposition 2.2 can be described as follows.

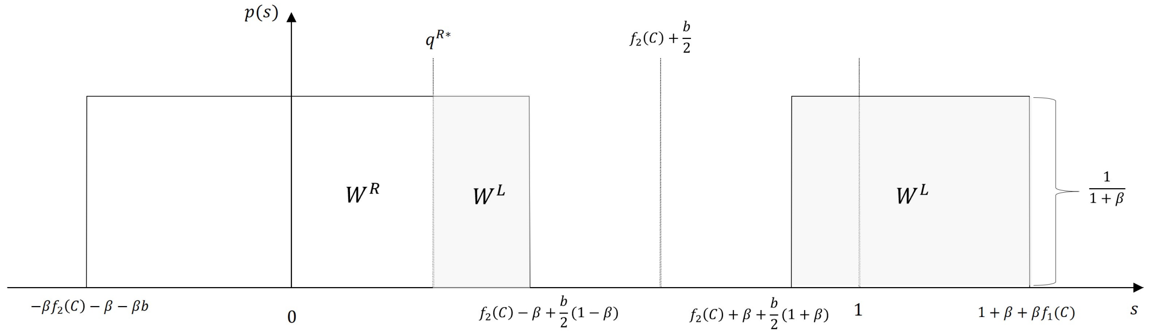
Proposition 2.5. In a subgame perfect Nash equilibrium, L chooses $(C_1^{L*}, C_2^{L*}) = (I^L, 0)$ and R chooses $(C_1^{R*}, C_2^{R*}) = (0, I^R)$. In stage 2, there are three types of unique equilibria.
(i) One media outlet chooses $(n_1, n_2) = (1, 0)$ and another chooses $(0, 1)$ if $\frac{\sqrt{15+8b}-(3+b)}{2} \leq \alpha \leq \frac{5+b-\sqrt{15+8b}}{2}$.
(ii) Both media outlets choose $(n_1, n_2) = (1, 0)$ if $\frac{5+b-\sqrt{15+8b}}{2} < \alpha$.
(iii) Both media outlets choose $(n_1, n_2) = (0, 1)$ if $\alpha < \frac{\sqrt{15+8b}-(3+b)}{2}$.

Figure 2.6 shows an example of equilibrium in *Case S*. The upper graph shows the salience distribution in g^L and the lower graph shows that in g^R. The main difference from the previous model is the cutoff points for media choice and voting. In g^L, the cutoff point for media choice is $f_2(\mathbf{C}) - b/2$, so more voters choose the media outlet that reports $(n_1, n_2) = (1, 0)$ than the case where there is no ideological preference. Additionally, since the cutoff point for voting changed to $q^{L*} < q^*$, more voters voted for L compared to the case where there was no ideological preference. On the other hand, in group g^R, since the cutoff point for media choice is $f_2(\mathbf{C}) + b/2$ and the cutoff point for voting changed to $q^{R*} > q^*$, the opposite occurs.

Even though cutoff points are different from the previous case, polarization of salience occurs in each group, as in the previous case. Therefore, the effect of polarization of salience on vote share is almost the same as Proposition 2.3: in a subgame perfect Nash equilibria where *Case S* happens, W^R would be higher than in the unbiased reporting case (q^*). However, the condition becomes stricter than in the previous case ($\alpha < 1 - q^* \Leftrightarrow q^* < 1 - \alpha$). Let us consider the case in g^L. Note first that in equilibrium, $f_2(\mathbf{C}^*) = 1 - \alpha$ holds. Then, the cutoff point for media choice would be $1 - \alpha - b/2$. Hence, if $q^{L*} < 1 - \alpha - b/2$ holds, polarization of salience would



(a) Distribution of Voters' Salience Weight in g^L



(b) Distribution of Voters' Salience Weight in g^R

Figure 2.6: Distribution of Voter's Salience Weight in *Case S*

increase W^R in g^L because voters who satisfy $1 - \alpha - b/2 < \theta^i$ do not change voting behavior through priming, but a fraction of voters who satisfy $\theta^i < 1 - \alpha - b/2$ change their voting from L to R through priming. This is the same logic as in Proposition 2.3. The same thing happens in g^R, and the condition for the same phenomena is $q^{R*} < 1 - \alpha + b/2$. Therefore, if both $q^{L*} < 1 - \alpha - b/2$ and $q^{R*} < 1 - \alpha + b/2$ hold, W^R would increase due to the polarization of salience. [30] In other words, as far as q^* is small enough, i.e., the policy quality advantage of L is sufficiently larger than that of R, the same conclusion as Proposition 2.3 can be sustained even when voters have ideological preference. [31]

2.4.2 The effect of the third issue

In the previous sections, we assume that there are only two issues: the issue that is advantageous to party L and the issue that is advantageous to party R. However, in the actual world, there

[30] The proof is exactly the same as Proposition 2.3, so we omit it.

[31] On the other hand, if one of each condition does not hold, the effect of polarization of salience on vote share becomes ambiguous. However, by using simulation, we can check that W^R would be higher than q^* in broad situations even if one of the conditions does not hold.

may be another issue that a fraction of voters consider more relevant than other issues. How do political parties and media outlets react to such an issue? In this subsection, we construct a model that incorporates the third issue and shows that parties' communication strategies may change based on the conditions, but the main results of the previous sections can be sustained.

Let us assume that there are two political parties $P \in \{L, R\}$ and two media outlets $M \in \{A, B\}$ as in the previous model, but there are three political issues, $k \in \{1, 2, 3\}$. The policy qualities of each party are defined as $q_1^L > q_1^R, q_2^L < q_2^R$. As in the previous section, assume that $|\Delta q_1| > |\Delta q_2|$, where $\Delta q_k \equiv q_k^L - q_k^R$. This means that party L has an advantage in issue 1 and R has an advantage in issue 2, but L has an advantage in total policy quality. As in issue 3, assume that L has an advantage, but the degree of the advantage is smaller than in other issues. More specifically, assume that $q_3^L > q_3^R$, and $|\Delta q_1| > |\Delta q_2| > |\Delta q_3|$. In other words, issue 3 is a relatively neutral issue for each party.

Voter i decides its voting based on the following utility function.

$$v^i = \Sigma_k s_k^i q_k = s_1^i q_1 + s_2^i q_2 + s_3^i q_3, \tag{2.28}$$

where s_k^i is a salience weight of voter i for issue k, which satisfies $\Sigma_k s_k^i = 1$. Therefore, voter i votes for L if

$$\begin{aligned} s_1^i q_1^L + s_2^i q_2^L + s_3^i q_3^L &> s_1^i q_1^R + s_2^i q_2^R + s_3^i q_3^R \\ \Leftrightarrow s_2^i(\Delta q_2 - \Delta q_3) &> -s_1^i(\Delta q_1 - \Delta q_3) - \Delta q_3 \\ \Leftrightarrow s_2^i &< s_1^i q^{**} + K, \end{aligned} \tag{2.29}$$

where $q^{**} = -\frac{\Delta q_1 - \Delta q_3}{\Delta q_2 - \Delta q_3} > 0$ and $K = -\frac{\Delta q_3}{\Delta q_2 - \Delta q_3} > 0$.

Next, the salience weight of voter i for issue k is determined as follows.

$$s_k^i = \max\{\min\{\theta_k^i + \beta[n_k^M - w_{k,m}^i \cdot n_l^M - w_{k,l}^i \cdot n_m^M]t(\theta^i), 1\}, 0\}, \tag{2.30}$$

where θ_k^i, is a prior salience weight of voter i toward issue k, $M \in \{A, B\}$ is a media outlet that voter i chooses in Stage 2, and $t(\theta^i)$ is a viewing time of voter i. $w_{k,m}^i$ is a relative weight of θ_k^i to θ_m^i, which is defined as $w_{k,m}^i \equiv \frac{\theta_k^i}{\theta_k^i + \theta_m^i}$.

We briefly explain the intuitive meaning of the representation (2.30). Suppose that voter i chooses a media outlet that provides $(n_1, n_2, n_3) = (1, 0, 0)$. Then, the salience weight for each issue can be expressed as

$$
\begin{aligned}
s_1^i &= \theta_1^i + \beta t(\theta^i). \\
s_2^i &= \theta_2^i - \frac{\theta_2^i}{\theta_2^i + \theta_3^i} \beta t(\theta^i). \\
s_3^i &= \theta_3^i - \frac{\theta_3^i}{\theta_2^i + \theta_3^i} \beta t(\theta^i).
\end{aligned}
$$

This expression means that voter i is primed toward issue 1 and the salience weight is increased by $\beta t(\theta^i)$ and $\beta t(\theta^i)$ is subtracted from the salience weights of the other two issues. In the above modeling, we assume that these salience weights are subtracted proportionally to the relative weights of the other prior salience ($w_{k,m}^i$). For example, if the prior salience of 2 and 3 are equal, the salience weights are subtracted by equal amounts. On the other hand, if the prior salience of 2 is larger than 3, s_2^i decreases more than s_3^i. [32]

Next, the viewing time of each voter is determined by the following maximization problem.

$$
\max_{M \in \{A,B\}, t \geq 0} u^i = \Sigma n_k^M (\theta_k^i + f_k(\mathbf{C})) t(\theta^i) - \frac{t(\theta^i)^2}{2}. \tag{2.31}
$$

In the above, $f_k(\mathbf{C})$ is a priming function of campaign spending. We assume that $f_k(\mathbf{C})$ satisfies (A1),(A2), and (A3) as in a two-dimensional case. Note that $t^*(\theta^i)$ is determined as $t^*(\theta^i) = \Sigma n_k^M (\theta_k^i + f_k(\mathbf{C}))$.

The above is the extended model for the three-dimensional issue case. Since the calculation becomes more complicated than the two-issue case, however, we analyze the situation where voters' distribution is discrete and show how the existence of a third issue affects the previous results. Assume that there are four groups of voters g^i, $i \in \{1, 2, 3, 4\}$. In this setting, group 1 has a higher salience weight for issue 1, 2 has a higher salience weight for issue 2, 3 has a higher salience weight for issue 3, and 4 has equal salience weights on each issue. More specifically, we assume the following symmetric setting.

[32] It is also possible to assume that salience weights are always equally subtracted (i.e., weights are always equal to 1/2). However, in this case, the definition of (2.30) would become more complicated because an additional definition is required to guarantee $\Sigma_k s_k^i = 1$. Under the definition of (2.30), such a problem does not occur.

$$\bar{\theta} = \theta_1^1 > \theta_2^1 = \theta_3^1 = \underline{\theta}.$$

$$\bar{\theta} = \theta_2^2 > \theta_1^2 = \theta_3^2 = \underline{\theta}.$$

$$\bar{\theta} = \theta_3^3 > \theta_1^3 = \theta_2^3 = \underline{\theta}.$$

$$\theta_1^4 = \theta_2^4 = \theta_3^4 = \frac{1}{3},$$

where θ_k^i is a prior salience weight, i is a group number $i \in \{1, 2, 3, 4\}$ and k is an issue $k \in \{1, 2, 3\}$. In this setting, if $\bar{\theta}$ is not large enough compared to $\underline{\theta}$, all voters group including g^2 vote for L. To exclude such an extreme case, assume that $\bar{\theta}$ is sufficiently large so that $\bar{\theta} > \underline{\theta}q^{**} + K$. This guarantees that g^2 votes for R before priming. Additionally, suppose that the size of group 4 is $\bar{\omega}$, the size of the other groups is $\underline{\omega}$, and $\bar{\omega}$ is large enough compared to $\underline{\omega}$. More precisely, we suppose that $\frac{\bar{\omega}}{\underline{\omega}} > 12$. This describes the situation in which the voters' distribution is dense in the center (g^4) and becomes scarce toward the tail (g^1, g^2, g^3).

In the following discussion, we only consider the case where there is no asymmetric total campaign budget, i.e., $\Sigma_k C_k^P \leq I, P \in \{L, R\}, I > 0$. Additionally, if the priming effect β is too small compared to q^{**} and K, it is possible that campaign spending and media reporting does not change any voters' behavior. To avoid such an uninteresting case, assume that β is sufficiently larger than q^{**} and K, and at least the center group (g^4) would change their voting from L to R when they are primed toward issue 2.[33]

Under those settings, we obtain the equilibrium in Stage 2 (media competition) as follows.

Proposition 2.6. The equilibrium in Stage 2 is determined as follows.

(i) If $f_k(\mathbf{C}) > f_l(\mathbf{C}), f_m(\mathbf{C})$, then both media outlets choose $n_k = 1$.

(ii) If $f_k(\mathbf{C}) = f_l(\mathbf{C}) > f_m(\mathbf{C})$, then one media outlet chooses $n_k = 1$, and another outlet chooses $n_l = 1$.

(iii) If $f_k(\mathbf{C}) = f_l(\mathbf{C}) = f_m(\mathbf{C})$, then there is no equilibrium.

(i) corresponds to *Cases B1 and B2* and (ii) corresponds to *Case S*. The intuition is the same as that of Proposition 2.1. If political parties focus their political campaign on only one specific issue in Stage 1, both media outlets have an incentive to report this issue because it is

[33]This can be guaranteed by the assumption $\beta > \frac{q^{**}-1+3K}{2+q^{**}}$. See Proof of Proposition 2.7.

the best strategy to maximize total viewing time. On the other hand, if each political party uses campaign spending to highlight different issues, reporting a different issue is the best media strategy to extract more viewing time from extreme voters.

Based on the equilibrium in the media competition stage, we obtain the subgame perfect Nash equilibrium as follows.

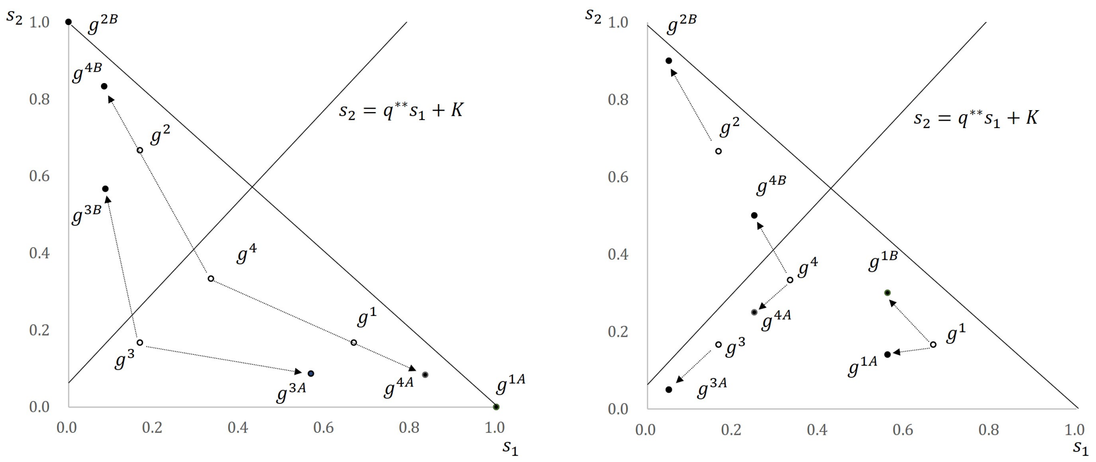
Proposition 2.7. There are two types of subgame perfect Nash Equilibria.
(i) In Stage 1, L chooses $(C_1^{L*}, C_2^{L*}, C_3^{L*}) = (I, 0, 0)$ and R chooses $(C_1^{R*}, C_2^{R*}, C_3^{R*}) = (0, I, 0)$. Then, in Stage 2, one outlet chooses $(n_1, n_2, n_3) = (1, 0, 0)$, and another outlet chooses $(n_1, n_2, n_3) = (0, 1, 0)$.
(ii) L chooses $(C_1^{L*}, C_2^{L*}, C_3^{L*}) = (0, 0, I)$ and R chooses $(C_1^{R*}, C_2^{R*}, C_3^{R*}) = (0, I, 0)$. Then, in Stage 2, one outlet chooses $(n_1, n_2, n_3) = (0, 1, 0)$, and another outlet chooses $(n_1, n_2, n_3) = (0, 0, 1)$.

The main implication is the same as Proposition 2.2. In stage 1, each party emphasizes a different issue from its rival. Therefore, in stage 2, each media outlet reports on a different issue. As a result, some voter groups strengthen their salience weights toward one issue, but other voter groups strengthen their salience weights toward another issue. The main difference with Proposition 2.2 is that there is a possibility that L emphasizes issue 3, which is a less advantageous issue for the party. To understand the implication of this result, we present two examples.

Example 2.1. L chooses $(C_1^L, C_2^L, C_3^L) = (I, 0, 0)$ and R chooses $(C_1^R, C_2^R, C_3^R) = (0, I, 0)$.

Let the parameter be $\beta = 0.6, \Delta q_1 = 2, \Delta q_2 = -1.5, \Delta q_3 = 0.1, \bar{\theta} = 2/3, \underline{\theta} = 1/6$. Suppose that L chooses $(C_1^L, C_2^L, C_3^L) = (I, 0, 0)$ and R chooses $(C_1^R, C_2^R, C_3^R) = (0, I, 0)$. Then, by Proposition 2.6, one outlet chooses $(n_1, n_2, n_3) = (1, 0, 0)$ and another outlet chooses $(n_1, n_2, n_3) = (0, 1, 0)$. Without loss of generality, assume that A chooses $(n_1^A, n_2^A, n_3^A) = (1, 0, 0)$ and B chooses $(n_1^B, n_2^B, n_3^B) = (0, 1, 0)$. In this case, g^1 chooses media outlet A and g^2 chooses media outlet B. On the other hand, since A and B are indifferent for g^3, half of them choose A and the other half of them choose B. The same thing happens for g^4, so half of them choose A and the other half of them choose B.

Figure 2.7 (a) shows the result. In this figure, we denote the group i that chooses $M \in \{A, B\}$ as g^{iM}. In this setting, L lost its voting share by the priming effect. Before priming, g^1, g^3, and



(a) Example 1 (b) Example 2

Figure 2.7: Polarization of Salience in a Three-dimensional Case

g^4 votes for L because their prior salience satisfies $s_2 < q^{**}s_1 + K$. Therefore, if there is no priming effect, the vote share for party L would be $\bar{\omega} + 2\underline{\omega} > 1/2$. However, through the priming effect, half of group g^3 change their voting from L to R because they increase the salience weight toward issue 2 by choosing media B. Additionally, for the same reason, half of the group g^4 changes the voting from L to R. As a result, the priming effect decreases the vote share for party L to $\bar{\omega}/2 + \underline{\omega}/2 + \underline{\omega} = 1/2$. This is the same result as Proposition 2.3.

Even if L changes its campaign spending to other issues, it cannot increase voting share. For example, if L decrease campaign spending to issue 1 and allocate it to issue 3, then both media outlets would choose $n_2 = 1$ (Proposition 2.6). As a result, more voter groups are primed toward issue 2, which is advantageous for R. Additionally, if L chooses $(C_1^L, C_2^L, C_3^L) = (0, 0, I)$, g^3 are primed toward issue 3 and vote for L, but half of g^1 are primed toward issue 2 and change their voting from L to R. As a result, this deviation cannot increase the vote share for L. Therefore, L has no incentive to deviate from $(C_1^L, C_2^L, C_3^L) = (I, 0, 0)$. For the same reason, R has no incentive to deviate from $(C_1^R, C_2^R, C_3^R) = (0, I, 0)$. [34]

Example 2.2. L chooses $(C_1^L, C_2^L, C_3^L) = (0, 0, I)$, and R chooses $(C_1^R, C_2^R, C_3^R) = (0, I, 0)$.

Let the parameter be the same as in Example 1, except that the priming effect is smaller,

[34] Precisely speaking, $(C_1^L, C_2^L, C_3^L) = (0, 0, I)$ does not increase the vote share for L as in Example 2 but provides the same vote share. Therefore, this strategy also becomes an equilibrium. More specifically, if L choose $(C_1^L, C_2^L, C_3^L) = (0, 0, I)$, one media outlet chooses $n_3 = 1$. In this case, g^3 chooses this media outlet and continues to vote for L after priming. However, half of g^1 chose media outlets that reported $n_2 = 1$ and primed them toward issue 2. As a result, half of g^1 change their voting from L to R, so this deviation would not increase the vote share of L but rather provides the same vote share as $(C_1^L, C_2^L, C_3^L) = (I, 0, 0)$.

e.g., $\beta = 0.2$. Suppose that L chooses $(C_1^L, C_2^L, C_3^L) = (0, 0, I)$ and R chooses $(C_1^R, C_2^R, C_3^R) = (0, I, 0)$. Note that by Proposition 2.6, one outlet chooses $n_3 = 1$ and another chooses $n_2 = 1$. Without loss of generality, assume that A chooses $(n_1^A, n_2^A, n_3^A) = (0, 0, 1)$ and $(n_1^B, n_2^B, n_3^B) = (0, 1, 0)$. Figure 2.7 (b) shows the result. In this equilibrium, g^3 chooses media outlet A and g^2 chooses media outlet B. On the other hand, since A and B are indifferent for g^4, half of them choose A and the other half of them choose B. The same thing happens for g^1, so half of them choose A and the other half of them choose B. Different from Example 1, g^3 is not divided and continues to vote for L. Additionally, even though g^1 is divided into issue 2 and issue 3, which is a less advantageous issue for L, they continue to vote for L. As a result, L can keep the vote shares of g^1 and g^3 by devoting campaign spending to issue 3.

Why does L have an incentive to attract voters' attention to issue 3, which is less advantageous than issue 1? The intuition is as follows. As an example shows, choosing $(C_1^L, C_2^L, C_3^L) = (0, 0, I)$ allows party L to prevent g^3 from being primed toward issue 2. However, if the priming effect β is high enough, as in Example 1, choosing $(C_1^L, C_2^L, C_3^L) = (0, 0, I)$ also leads to losing the vote share of g^1 because a fraction of g^1 that was primed toward issue 2 change their voting from L to R. On the other hand, if β is as small as in Example 2, g^1 continues to vote for L even if they are primed toward issue 2. Therefore, L has an incentive to focus on attracting attention from g^3 rather than g^1. The main difference between the two issue cases is that the direction in which polarization of issue salience occurs may change depending on the parameter. As the above examples show, it is possible that voters are primed toward less advantageous issues for a party instead of the most advantageous issue.

Even though there are some variations in political parties' communication strategies in the three-dimensional case, the political outcome is the same as in the previous sections. In equilibrium, political parties emphasize different political issues, and media outlets also report different issues from their rivals. As a result, voters' salience weight becomes polarized, and the vote share of the party that has lower policy quality increases. In the above examples, a voter group that has a balanced interest in each political issue (g^4) is split in any case and strengthens its interest toward different political issues. As a result, half of the group changes their voting behavior through the priming effect, leading to an increase in W^R. This is the same mechanism as in Proposition 2.3.

2.5 Conclusion

Summary. In this study, we develop an issue selection model that incorporates media competition. In contrast to the extant literature analyzing issue selection strategies with endogenous weights, we reveal that media competition plays a crucial role in causing polarization of issue salience among voters. Additionally, we find that this mechanism may increase the vote share of the inferior party, i.e., the party that has lower-quality policy proposals. Through this study, we do not intend to argue that media competition is the only reason why polarization of issue salience takes place. However, the theoretical literature that analyzes issue selection strategies does not explicitly consider media competition. In addition, to the best of my knowledge, no studies have revealed the reason why the polarization of issue salience arises in issue selection models. One contribution of this study is that it provides a possible cause of issue salience polarization from the perspective of media competition combined with parties' issue selection strategies.

Empirical Predictions. The model provides several empirical predictions. First, the model predicts that each media outlet chooses a different political issue, even when media outlets do not have ideological preferences. Additionally, the condition of divergence of issue coverage is determined by parties' political communication. Several empirical studies support this prediction, although most of them focus on partisan media outlets. For example, Puglisi (2011) analyzes a data set of news from The New York Times and shows that it places more emphasis on topics in which the Democratic Party has issue ownership. Puglisi and Snyder Jr (2011) analyze how newspapers deal with political scandals and show that left-leaning newspapers provide more coverage to scandals involving Republicans, but the opposite occurs with right-leaned newspapers. Larcinese et al. (2011) also show that pro-Democratic newspapers give more coverage to high unemployment when there are Republican incumbent. One exception to the focus on partisan media outlets is Nimark and Pitschner (2019). Nimark and Pitschner (2019) analyze 17 U.S. newspapers, including nonpartisan outlets, using a machine-learning technique and show that different newspapers specialize in different topics, which is consistent with the prediction of the current paper. Also, several empirical studies confirm that political parties influence media issue coverage (Brandenburg, 2002; Stroud, 2011; Gilardi et al., 2022). In particular, Stroud (2011) reveals that parties' campaign rhetoric leads the different issue coverage of cable networks/newspapers through coding analysis of news content and parties' campaign rhetoric in the 2004 U.S. presidential election. This result is consistent with the prediction of the current paper.

Second, the model predicts that voters who have different prior salience weights strengthen their issue salience in the opposite direction due to different media selection. In this regard, Stroud (2011) provides some supportive evidence. Using panel survey data from the 2004 U.S. presidential election, Stroud (2011) provides evidence that the use of conservative media increased the probability of naming Republican issues (*Terrorism*) as the most important. On the other hand, voters who consumed liberal media were less likely to name it as the most important issue. As a result, the difference regarding the perception of "What is an important issue" was growing during the political campaign. There is also empirical literature that shows that different media selection polarized voters' perceptions of the attributes or traits of candidates (Stroud, 2010; Muddiman et al., 2014; Hyun and Moon, 2016). However, to the best of my knowledge, few empirical studies directly investigate how media choice causes polarization of issue salience. To test the prediction, we have to check how voters' issue salience changed through media choice and political campaigns using panel data that cover the period before and after the political campaign.

Third, the model predicts that the party perceived as inferior would increase the winning probability/vote share through the polarization of issue salience. The prediction stems from the mechanism of Proposition 2.3. If the model prediction is correct, we will likely observe that a change in salience of the issue selected by an inferior party (it may be an unfavorable party in pre-election polls) is more likely to change voters' decision, but that of another party is less likely to change it. One possible way to verify the prediction is to determine how voters' perceptions of "the most important issue" change and the resultant voting behavior at the individual level by using panel data covering the before and after of campaign period.[35]. Several empirical studies investigate the effect of issue salience on vote choice (Bélanger and Meguid, 2008; Green and Hobolt, 2008; Kiousis et al., 2015). However, to the best of my knowledge, no research focuses on which salience of the issue is more likely to change voting behavior.

Future Research. There are some prospective venues for extending the theoretical model.

[35] It is common to use the answer for "What is the most important issue" as an indicator of voters' issue salience in the empirical literature (Iyengar and Kinder, 2010; Stroud, 2011; McCombs and Valenzuela, 2020)

First, in this paper, we assume that the quality of policy proposals is exogenously determined. In other words, we omit a policy quality investment stage such as that in Aragonès et al. (2015). The investment in policy proposal quality may also affect issue selection and media competition, so incorporating this stage may be a prospective avenue for future research. Additionally, Denter (2020) develops a model in which parties' campaign effort affects not only *priming* but also *persuasion* at the same time. Investigating the relationship between these two aspects of campaign effort simultaneously in the current model would also be an interesting topic for future research. Second, in this article, we assume that the number of media outlets is fixed. However, it is possible to allow the exit/entry of media outlets, and this may change the media effect on voters' salience weight in a different way. Investigating the effect of the entry/exit of media outlets on voters' salience weight is another interesting topic for future research.

Appendix A

A.1. Endogenous campaign budget

In this study, we assume that each party is constrained by the total amount of the campaign budget ($\Sigma_k C_k^L \leq I^L, \Sigma_k C_k^R \leq I^R$). However, another interpretation of campaign communication is that political parties' campaign spending has marginal costs, but there is no total amount constraint. In this subsection, we show that the main results can be sustained even in this setting.

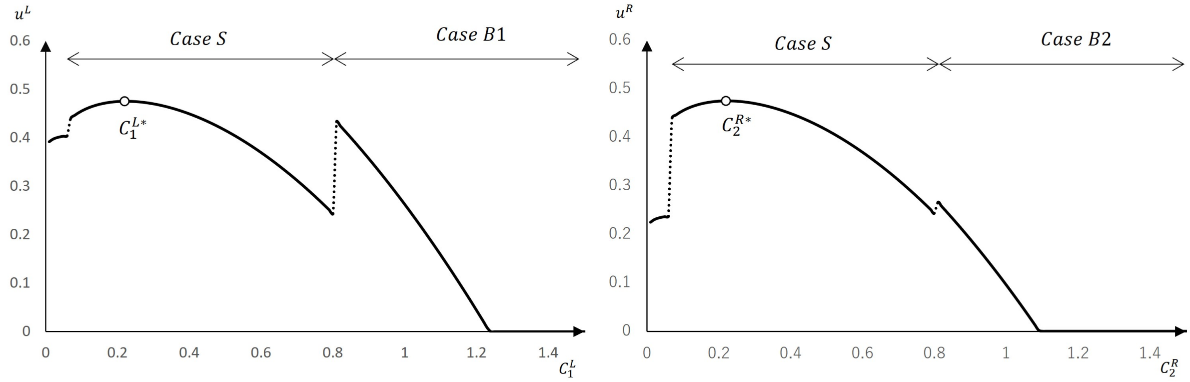
Suppose that C_k^P is a campaign spending of party $P \in \{L, R\}$ for issue $k \in \{1, 2\}$. Different from the previous setting, there are no constraints on the total amount of spending, but it imposes marginal costs on political parties.

In this subsection, we assume the specific type of priming function as follows.

$$f_k(\mathbf{C}) = \begin{cases} \frac{1}{2} & \text{if } \Sigma_P C_k^P = \Sigma_P C_l^P = 0. \\ \frac{(\Sigma_P C_k^P)^a}{(\Sigma_P C_k^P)^a + (\Sigma_P C_l^P)^a} & \text{otherwise,} \end{cases} \tag{2.32}$$

where $0 < a \leq 1$. This is the typical form of the contest success function proposed by Tullock (2001). Note that this functional form satisfies (A1)-(A3). Additionally, $\frac{\partial f_1(\mathbf{C})}{\partial C_1} > 0, \frac{\partial^2 f_1(\mathbf{C})}{\partial C_1^2} < 0$ and $\frac{\partial f_2(\mathbf{C})}{\partial C_2} > 0, \frac{\partial^2 f_2(\mathbf{C})}{\partial C_2^2} < 0$ holds.

Suppose that both parties' objective is to maximize their vote share minus the cost of cam-



(a) Utility of party L (b) Utility of party R

Figure 2.8: Parties' utility according to campaign spending

paign spending. We define the utility function of party $P \in \{L, R\}$ as follows.

$$u^P(\mathbf{C}_1, \mathbf{C}_2, \mathbf{n}^A, \mathbf{n}^B) = W^P(\mathbf{C}_1, \mathbf{C}_2, \mathbf{n}^A, \mathbf{n}^B) - \frac{(C_1^P)^2}{2} - \frac{(C_2^P)^2}{2}. \tag{2.33}$$

Under this setting, we obtain the modified version of Proposition 2.2 (Proposition 2.1 does not change).

Proposition 2.8. There are two types of *potential* subgame perfect Nash equilibria.
(i) If $q^* < \frac{1}{2} - \beta, (\mathbf{C}^{L*}, \mathbf{C}^{R*}) = ((\frac{1}{2}\sqrt{\frac{a\beta}{1+\beta}}, 0), (0, \frac{1}{2}\sqrt{\frac{a\beta}{1+\beta}}))$.
(ii) If $q^* > \frac{1}{2} - \beta, (\mathbf{C}^{L*}, \mathbf{C}^{R*}) = ((\frac{\sqrt{a}}{2}, 0), (0, \frac{\sqrt{a}}{2}))$.

In both cases, one media outlet chooses $(1, 0)$ and another outlet chooses $(0, 1)$ in Stage 2, i.e., a potential equilibrium exists only in *Case S*.

Therefore, even in the endogenous budget setting, the conclusion is almost the same. Each party devotes their campaign spending to the issue that they have advantages. As a result, divergence of issue coverage in media competition occurs, and voters' issue salience weights become polarized.

There are some technical notes. In this setting, we assume that the marginal cost of campaign spending for each party is symmetric. Therefore, in equilibrium, $f_1(\mathbf{C}) = f_2(\mathbf{C}) = 1/2$ holds. As a result, different from Proposition 2.2, *Case B1* and *Case B2* do not occur, since those cases are caused only when one of each issue is emphasized disproportionally.

Additionally, the equilibrium of Proposition 2.8 is a *potential* one. The reason is as follows.

Different from the previous setting, there are no constraints on the amount of campaign spending by each party. Then, each party has the possibility of increasing campaign spending on its advantageous issue and deviate to another case, i.e., L has an incentive to deviate to *Case B1* and R has an incentive to deviate to *Case B2*. Therefore, another restriction is required to guarantee the existence of an equilibrium. One possibility is a restriction on a priming function $f_k(\mathbf{C})$. For example, if a is small enough, both parties do not have an incentive to deviate. Figure 2.8 shows an example, where we set the parameters as $a = 0.2, \beta = 0.2, q^* = 0.4$. In this case, even if each party deviates to other cases, they would not increase their utility because deviation to *Case B1* or *Case B2* requires significant cost. The reason is as follows. By Proposition 2.1, each media outlet has an incentive to deviate to *Case B1* if $\frac{5-\sqrt{15}}{2} < f_1(\mathbf{C})$. This condition can be rewritten as $\frac{5-\sqrt{15}}{2} < f_1(\mathbf{C}) \Leftrightarrow \frac{\Sigma_P C_1^P}{\Sigma_P C_2^P} > \left(\frac{5-\sqrt{15}}{\sqrt{15}-3}\right)^{\frac{1}{a}}$. In the same way, we can calculate that each media outlet has an incentive to deviate to *Case B2* if $\frac{\Sigma_P C_2^P}{\Sigma_P C_1^P} > \left(\frac{5-\sqrt{15}}{\sqrt{15}-3}\right)^{\frac{1}{a}}$. Since $\frac{5-\sqrt{15}}{\sqrt{15}-3} > 1$, if a is small enough, the relative campaign spending required to deviate to *Case B1* and *Case B2* becomes large. Therefore, if a is small enough, it becomes impossible for each party to deviate to other cases. [36]

Another possible way to guarantee the existence of equilibrium is to consider the asymmetric reporting cost of media outlets. For example, suppose that each media outlet has an issue on which it has a disadvantage, and increasing the ratio of this issue would impose an additional cost. Without loss of generality, suppose that A has a disadvantage in issue 2 and B has a disadvantage in issue 1. The intuitive explanation for the media's asymmetric cost is as follows. If A is going to report on issue 1, it can collect information about this issue through its existing information assets, such as relationships with politicians and interest groups that have information about the issue. When increasing the reporting ratio of issue 2, however, the outlet cannot collect information about the issue using its existing information assets. Hence, it must hire outside staff to obtain new information or create new relationships with politicians and interest groups that have information about issue 2.

Then, the profit function of each outlet can be written as

$$\pi^A = T^A - \frac{(n_2^A)^2}{2} \quad \text{and} \quad \pi^B = T^B - \frac{(n_1^B)^2}{2}. \tag{2.34}$$

[36] Precisely speaking, a also affects equilibrium campaign spending, so we have to compare both effects: the effect on cutoff points of media competition and the effect on equilibrium campaign spending. We can check that when a is small enough, the former effect exceeds the latter.

Under this setting, we can check that the cutoff points of media competition stated in Proposition 2.1 change and that it becomes impossible for both parties to deviate to another case, i.e., *Case B1* and *Case B2*. However, in all cases, the main results of the article do not change.

A.2. Direct campaign

In this study, we argue that polarization of salience is caused by the combination of media competition and parties' issue selection strategies. However, it is not necessarily clear what role each factor has in explaining the phenomena. To clarify this point, in the following two subsections, we consider the simple case where either political campaign or media competition solely affects voters' issue salience. In this subsection, we consider the former case in which there is no media competition and parties have to invest in campaign communication directly to attract voters' attention. As a result, we show that parties' issue strategy alone cannot explain the main results of the current study. In the next subsection, we show how media competition solely explains the main result of the current study.

The basic model is the one discussed in section 2.3. The game is extended as follows.

- **Stage 1** Each party decides the amount of campaign spending (C_1^P, C_2^P), which affects the voters' salience weights directly.
- **Stage 2** Voters vote for one of the parties based on parties' policy quality (q_1^P, q_2^P) and voters' salience weights *after priming.*

The difference from the model in the previous section is that there are no media outlets, so voters cannot choose the news source based on their prior salience θ^i. In a direct campaign situation, we suppose that voters' salience after priming can be determined as follows.

$$s^i = \max\Big\{\min\Big\{\theta^i + \beta\frac{\Sigma_P C_1^P - \Sigma_P C_2^P}{\Sigma_P C_1^P + \Sigma_P C_2^P}, 1\Big\}, 0\Big\}, \tag{2.35}$$

where $\beta \in (0,1)$ is a priming effect of political campaigns. Since voters cannot choose the news source based on their prior salience, they assess the political campaigns on both issues directly. If the campaign spending on issue 1 is larger than that on issue 2, all voters' salience is inclined toward issue 1 and vice versa.

As in Proposition 2.2, it is clear that L would choose $(C_1^L, C_2^L) = (I^L, 0)$ and $(C_1^R, C_2^R) = (0, I^R)$ since L has an incentive to increase s^i and R has an incentive to decrease s^i. As a result, in equilibrium, $s^i = \theta^i + \beta\frac{I^L - I^R}{I^L + I^R}$ holds. This means that voters' salience weight moves in the same direction. What happens to the vote share? Since voter's prior salience weights θ^i are distributed on $[0, 1]$, the vote share of L would be $W^L = 1 - q^* + \beta\frac{I^L - I^R}{I^L + I^R}$. Therefore, if $I^L > I^R$, W^L increases and if $I^L < I^R$, W^R increases compared to the unbiased reporting case. However, since all voters' salience weights move in the same direction, polarization of salience does not occur. Additionally, different from Proposition 2.3, W^R would not increase as long as $I^L \geq I^R$ holds. In Proposition 2.3, we show that even when R has a disadvantage in its campaign budget, there is a possibility that the priming effect would increase W^R. However, in a direct campaign setting, this does not happen. This conclusion means that the issue selection solely does not explain the main result.

A.3. The effect of media competition without issue selection

In this subsection, we investigate the simple model where there is no issue selection (political campaign) and how media competition solely affects voters' salience weights. We consider the following simple three-stage game.

- **Stage 1** Two media outlets $M \in \{A, B\}$ choose their reporting ratios for each political issue (n_1^M, n_2^M).
- **Stage 2** Voters each choose one media outlet $M \in \{A, B\}$ and decide their viewing time $t^*(\theta^i)$.
- **Stage 3** Voters vote for one of the parties based on parties' policy quality (q_1^P, q_2^P) and voters' salience weights *after priming.*

Therefore, there is no political campaign stage. Since there is no political campaign, we assume that $f_1(\mathbf{C}) = f_2(\mathbf{C}) = 0$, i.e., political parties do not affect voters' salience. Then, the viewing utility of each voter i can be redefined as follows.

$$\max_{M \in \{A,B\}, t \geq 0} u^i = [n_1^M \theta^i + n_2^M (1 - \theta^i)] t(\theta^i) - \frac{t(\theta^i)^2}{2}. \tag{2.36}$$

This is a modified version of (2.3). Note that $t^*(\theta^i) = n_1^M \theta^i + n_2^M(1-\theta^i)$. By applying the same logic as in Section 2.3.1, the condition in which θ^i prefers media outlet A to B can be written as

$$\theta^i > 1/2, \quad \text{if } n_1^A - n_1^B > 0 \quad (\Leftrightarrow n_2^A - n_2^B < 0). \tag{2.37}$$

$$\theta^i < 1/2, \quad \text{if } n_1^A - n_1^B < 0 \quad (\Leftrightarrow n_2^A - n_2^B > 0). \tag{2.38}$$

By using this analysis, we can confirm that in media competition (Stage 2), one media outlet chooses $(n_1, n_2) = (1, 0)$ and another chooses $(n_1, n_2) = (0, 1)$ (*Case S*). The main difference from Proposition 2.1 is that *Case S* is a unique equilibrium if there is no political campaign. The proof is almost the same as that of Proposition 2.1. Suppose that A chooses $(1, 0)$ and B chooses $(0, 1)$. Then, it is straightforward to verify that $T^A = \int_{1/2}^{1} \theta^i d\theta = 3/8$ and $T^B = \int_0^{1/2} (1-\theta^i) d\theta = 3/8$. Similar to the logic in Proposition 2.1, they do not have an incentive to change (n_1, n_2) so that $0 < n_1, n_2 < 1$ because any voters do not change their media choice but decrease their viewing time. Additionally, if they move in the completely opposite direction, it reduces the total viewing time. For example, if A changes its reporting ratio to $(0, 1)$, then the total viewing time would be $T^A = 1/2 \int_0^1 (1-\theta^i) d\theta = 1/4$. The same logic can be applied to B. Therefore, *Case S* becomes a unique equilibrium. As a result, polarization of salience occurs without political campaigns. More specifically, voters who satisfy $\theta^i > 1/2$ are primed toward issue 1, and voters who satisfy $\theta^i < 1/2$ are primed toward issue 2.

However, note that the distance between the salience weight of voters who choose different media outlets becomes smaller than in the basic model. This is straightforward because the degree of priming is determined by viewing time $t^*(\theta^i) = n_1^M[\theta^i + f_1(\mathbf{C})] + n_2^M[(1-\theta^i) + f_2(\mathbf{C})]$. Therefore, if there is no campaign effect, $t^*(\theta^i)$ decreases to $n_1^M \theta^i + n_2^M(1-\theta^i)$, so the priming effect becomes weak. In other words, political campaigns have a multiplicative effect on the degree of polarization of voters' salience weights.

Appendix B

B.1. Proof of Proposition 2.1

First, we show that all pairs of strategies other than the pairs stated in Proposition 2.1 cannot be in equilibrium. Without loss of generality, suppose that $0 < n_1^A, n_2^A < 1$. We show that media outlet A always has an incentive to deviate. There are three cases.

(i) $n_1^A < n_1^B (\Leftrightarrow n_2^A > n_2^B)$

In this case, voters who satisfy $\theta^i < f_2(\mathbf{C})$ choose A. Therefore, the total viewing time of A can be written as

$$T^A = \int_0^{f_2(\mathbf{C})} \{n_1^A \left[\theta^i + f_1(\mathbf{C})\right] + n_2^A \left[(1-\theta^i) + f_2(\mathbf{C})\right]\} d\theta. \tag{2.39}$$

Since $\theta^i + f_1(\mathbf{C}) < (1-\theta^i) + f_2(\mathbf{C})$ holds for all $\theta^i < f_2(\mathbf{C})$, A has an incentive to increase n_2^A (note that voters' media choice does not change if A increases n_2^A).

(ii) $n_1^A > n_1^B (\Leftrightarrow n_2^A < n_2^B)$

In this case, voters who satisfy $\theta^i > f_2(\mathbf{C})$ choose A. Therefore, the total viewing time of A can be written as

$$T^A = \int_{f_2(\mathbf{C})}^{1} \{n_1^A \left[\theta^i + f_1(\mathbf{C})\right] + n_2^A \left[(1-\theta^i) + f_2(\mathbf{C})\right]\} d\theta. \tag{2.40}$$

Since $\theta^i + f_1(\mathbf{C}) > (1-\theta^i) + f_2(\mathbf{C})$ holds for all $\theta^i > f_2(\mathbf{C})$, A has an incentive to increase n_1^A.

(iii) $n_1^A = n_1^B \quad (\Leftrightarrow n_2^A = n_2^B)$.

In the following, we show the case $f_1(\mathbf{C}) \geq 1/2$. The case $f_1(\mathbf{C}) < 1/2$ can be proven in the same manner. Note first that when $n_k^A = n_k^B$, viewers choose a media outlet by flipping a fair coin with probability $1/2$. Therefore, the total viewing time of A can be calculated as

$$\begin{aligned}
&\frac{1}{2}\int_0^1 \{n_1^A[\theta^i + f_1(\mathbf{C})] + n_2^A[(1-\theta^i) + f_2(\mathbf{C})]\}d\theta \\
&\quad\Leftrightarrow \frac{1}{2}\left[n_1^A[\frac{(\theta^i)^2}{2} + f_1(\mathbf{C})\theta^i] + n_2^A[\theta^i - \frac{(\theta^i)^2}{2} + f_2(\mathbf{C})\theta^i]\right]_0^1 \\
&\quad\Leftrightarrow \frac{1}{4} + \frac{n_1^A - n_2^A}{2} f_1(\mathbf{C}) + \frac{n_2^A}{2}.
\end{aligned} \tag{2.41}$$

If A deviates from $(1,0)$, voter $\theta^i > f_2(\mathbf{C})$ chooses A. Hence, the total viewing time for A would be

$$\begin{aligned}
\int_{f_2(\mathbf{C})}^1 [\theta^i + f_1(\mathbf{C})]d\theta &= \left[\frac{(\theta^i)^2}{2} + f_1(\mathbf{C})\theta^i\right]_{f_2(\mathbf{C})}^1 \\
&\Leftrightarrow f_1(\mathbf{C}) + \frac{f_1(\mathbf{C})^2}{2}.
\end{aligned} \tag{2.42}$$

The total viewing time is longer than it was before because

$$\begin{aligned}
f_1(\mathbf{C}) + \frac{f_1(\mathbf{C})^2}{2} &> \frac{1}{4} + \frac{n_1^A - n_2^A}{2} f_1(\mathbf{C}) + \frac{n_2^A}{2} \\
&\Leftrightarrow 2f_1(\mathbf{C}) + f_1(\mathbf{C})^2 > \frac{1}{2} + (n_1^A - n_2^A) f_1(\mathbf{C}) + n_2^A \\
&\Leftrightarrow [f_1(\mathbf{C}) - \frac{1}{2}] + (n_1^A + n_2^A) f_1(\mathbf{C}) + f_1(\mathbf{C})^2 > (n_1^A - n_2^A) f_1(\mathbf{C}) + n_2^A \\
&\Leftrightarrow [f_1(\mathbf{C}) - \frac{1}{2}] + f_1(\mathbf{C})^2 + n_2^A\,[2f_1(\mathbf{C}) - 1] > 0.
\end{aligned} \tag{2.43}$$

This inequality holds since $f_1(\mathbf{C}) \geq \frac{1}{2}$. Hence, A has an incentive to deviate to $(1,0)$.

Therefore, each media outlet must choose $(n_1, n_2) = (1,0)$ or $(n_1, n_2) = (0,1)$. Finally, we show the conditions for the equilibrium stated in Proposition 2.1. Without loss of generality, suppose that $(n_1^A, n_2^A) = (1,0)$ and $(n_1^B, n_2^B) = (0,1)$. In this case, they have no incentive to decrease n_1^A, n_2^B except $n_1^A, n_2^B = 0$ because this change would decrease viewing time, as shown in Figure 2.1. Hence, we have only to check whether they have an incentive running in the completely opposite direction. Let us consider the case of A.

The total viewing time of A in $(1,0)$ can be calculated as

$$T^A = \int_{f_2(\mathbf{C})}^{1} [\theta^i + f_1(\mathbf{C})]d\theta = \left[\frac{(\theta^i)^2}{2} + f_1(\mathbf{C})\theta^i\right]_{f_2(\mathbf{C})}^{1}$$
$$= f_1(\mathbf{C}) + \frac{f_1(\mathbf{C})^2}{2}. \tag{2.44}$$

If A deviates to $(0,1)$, T^A would be

$$T^A = \frac{1}{2}\int_0^1 [(1-\theta^i) + f_2(\mathbf{C})]d\theta \Leftrightarrow \frac{1}{2}\left[\theta^i - \frac{(\theta^i)^2}{2} + f_2(\mathbf{C})\theta^i\right]_0^1$$
$$\Leftrightarrow \frac{f_2(\mathbf{C})}{2} + \frac{1}{4}. \tag{2.45}$$

A deviates to $(0,1)$ if the total viewing time in this position is larger than that in $(1,0)$. Hence, this condition can be written as

$$f_1(\mathbf{C}) + \frac{f_1(\mathbf{C})^2}{2} < \frac{f_2(\mathbf{C})}{2} + \frac{1}{4}. \tag{2.46}$$

By arranging this equation, we have

$$f_1(\mathbf{C})^2 + 3f_1(\mathbf{C}) - \frac{3}{2} < 0. \tag{2.47}$$

By solving this inequality with respect to $f_1(\mathbf{C})$, we obtain $f_1(\mathbf{C}) < \frac{\sqrt{15}-3}{2}$. If this inequality holds, A has an incentive to deviate to $(0,1)$, and this becomes an equilibrium. The same condition for B can be calculated in the same manner, and we obtain that B has an incentive to deviate in the opposite direction if $\frac{5-\sqrt{15}}{2} < f_1(\mathbf{C})$. In other words, as long as $\frac{\sqrt{15}-3}{2} \leq f_1(\mathbf{C}) \leq \frac{5-\sqrt{15}}{2}$ holds, one outlet chooses $(1,0)$, and the other chooses $(0,1)$, and both parties have no incentive to deviate. □

B.2. Proof of Proposition 2.2

To avoid implausible equilibria, we eliminate the extreme case where $W^P = 0$ or $W^P = 1$ and show that in each media competition equilibrium, W^L would be an increasing function of $f_1(\mathbf{C})$.

(i) *Case S*

(a) $q^* < f_2(\mathbf{C}) - \beta$ (see Figure 2.4 (a))

$$W^L = \frac{1+\beta+\beta f_1(\mathbf{C}) - f_2(\mathbf{C}) - \beta}{1+\beta} + \frac{f_2(\mathbf{C}) - \beta - q^*}{1+\beta} = \frac{\beta}{1+\beta} f_1(\mathbf{C}) + \frac{1-\beta-q^*}{1+\beta}. \quad (2.48)$$

(b) $q^* \geq f_2(\mathbf{C}) - \beta$ (see Figure 2.4 (b))

$$W^L = \frac{1+\beta+\beta f_1(\mathbf{C}) - f_2(\mathbf{C}) - \beta}{1+\beta} = f_1(\mathbf{C}). \quad (2.49)$$

(ii) *Case B1* (see Figure 2.5 (a))

$$W^L = \frac{1+\beta+\beta f_1(\mathbf{C}) - q^*}{1+\beta} = \frac{\beta}{1+\beta} f_1(\mathbf{C}) + \frac{1+\beta-q^*}{1+\beta}. \quad (2.50)$$

(iii) *Case B2* (see Figure 2.5 (b))

$$W^L = \frac{1-\beta f_2(\mathbf{C}) - q^*}{1+\beta} = \frac{\beta}{1+\beta} f_1(\mathbf{C}) + \frac{1-\beta-q^*}{1+\beta}. \quad (2.51)$$

In either case, W^L is an increasing function of $f_1(\mathbf{C})$, so L has an incentive to increase C_1^L until $C_1^L = I^L$ and $C_2^L = 0$. The same logic can be applied to R, and R has an incentive to increase C_2^R until $C_2^R = I^R$ and $C_1^R = 0$. Therefore, in equilibrium, $f_1(\mathbf{C}) = f_1(I^L, I^R) = \alpha$. By combining Proposition 2.1, we obtain the result. □

B.3. Proof of Proposition 2.3

There are two cases.

(a) $q^* < f_2(\mathbf{C}^*) - \beta$ (See Figure 2.4 (a))

Note first that the vote share of R in the unbiased reporting case is q^*. Additionally, in equilibrium, $f_2(\mathbf{C}^*) = 1 - \alpha$ holds. Therefore, W^R is larger than in the unbiased case if

$$
\begin{aligned}
W^R &= \frac{q^* + \beta(1-\alpha) + \beta}{1+\beta} > q^* \\
&\Leftrightarrow q^* + \beta(1-\alpha) + \beta > (1+\beta)q^* \\
&\Leftrightarrow \beta(1-q^*) + \beta(1-\alpha) > 0.
\end{aligned} \tag{2.52}
$$

This is true by definition.

(b) $q^* \geq f_2(\mathbf{C}^*) - \beta$ (See Figure 2.4 (b))

Since $q^* \geq f_2(\mathbf{C}^*) - \beta$ holds, $W^R(\mathbf{C}^{L*}, \mathbf{C}^{R*}) = f_2(\mathbf{C}^*) = 1 - \alpha$. By assumption, $1 - \alpha > q^* \Leftrightarrow \alpha < 1 - q^*$. $\square$

B.4. Proof of Proposition 2.4

The proof for both outlets having an incentive to choose $(n_1, n_2) = (1, 0)$ or $(n_1, n_2) = (0, 1)$ is the same as that of Proposition 2.1, so we omit this part. We only show the conditions in which each equilibrium stated in Proposition 2.4 occurs. Without loss of generality, suppose that $(n_1^A, n_2^A) = (1, 0)$ and $(n_1^B, n_2^B) = (0, 1)$. Let us consider the deviation condition for A.

When A choose $(1, 0)$, voters who satisfy $\theta^i > f_2(\mathbf{C}) - b/2$ choose A in g^L. Therefore, the total viewing time for A in g^L can be calculated as

$$
\int_{f_2(\mathbf{C})-b/2}^{1} [\theta^i + f_1(\mathbf{C}) + b] d\theta = \frac{f_1(\mathbf{C})^2}{2} + (1+b) f_1(\mathbf{C}) + \frac{b}{2} + \frac{3}{8} b^2. \tag{2.53}
$$

Additionally, in g^R, voters who satisfy $\theta^i > f_2(\mathbf{C}) + b/2$ choose A. Therefore, the total viewing time for A in g^R can be calculated as

$$
\int_{f_2(\mathbf{C})+b/2}^{1} [\theta^i + f_1(\mathbf{C})] d\theta = \frac{f_1(\mathbf{C})^2}{2} + f_1(\mathbf{C}) - \frac{b}{2} - \frac{1}{8} b^2. \tag{2.54}
$$

Note that the size of each group is 1/2. Therefore, the total viewing time for media outlet A is

$$
T^A = \frac{f_1(\mathbf{C})^2}{2} + (1 + \frac{b}{2}) f_1(\mathbf{C}) + \frac{b^2}{8}. \tag{2.55}
$$

If A deviates from $(0,1)$, the total viewing time can be calculated as

$$T^A = \frac{1}{2}\Big[\underbrace{\frac{1}{2}\int_0^1 [1-\theta^i + f_2(\mathbf{C}) + b]d\theta}_{g^R} + \underbrace{\frac{1}{2}\int_0^1 [1-\theta^i + f_2(\mathbf{C})]d\theta}_{g^L}\Big] = \frac{2f_2(\mathbf{C})+1+b}{4}. \qquad (2.56)$$

A deviates to $(0,1)$ if the total viewing time in this position is larger than that in $(1,0)$. Hence, this condition can be written as

$$\frac{f_1(\mathbf{C})^2}{2} + (1+\frac{b}{2})f_1(\mathbf{C}) + \frac{b^2}{8} < \frac{2f_2(\mathbf{C})+1+b}{4}. \qquad (2.57)$$

By arranging this equation, we have

$$f_1(\mathbf{C})^2 + (3+b)f_1(\mathbf{C}) + \frac{1}{4}(b^2-2b-6) < 0. \qquad (2.58)$$

By solving this inequality with respect to $f_1(\mathbf{C})$, we obtain $f_1(\mathbf{C}) < \frac{\sqrt{15+8b}-(3+b)}{2}$. If this inequality holds, A has an incentive to deviate to $(0,1)$, and this becomes an equilibrium. The same condition for B can be calculated in the same manner, and we obtain that B has an incentive to deviate in the opposite direction if $\frac{5+b-\sqrt{15+8b}}{2} < f_1(\mathbf{C})$. In other words, as long as $\frac{\sqrt{15+8b}-(3+b)}{2} \leq f_1(\mathbf{C}) \leq \frac{5+b-\sqrt{15+8b}}{2}$ holds, one outlet chooses $(1,0)$, and the other chooses $(0,1)$, and both parties have no incentive to deviate. □

B.5. Proof of Proposition 2.5

To avoid implausible equilibria, we eliminate the extreme case where $W^P = 0$ or $W^P = 1$. Then, by applying the same logic as in Proof of Proposition 2.2 to each group (g^L, g^R), it is straightforward to check that L chooses $(C_1^L, C_2^L) = (I^L, 0)$ and R chooses $(C_1^R, C_2^R) = (0, I^R)$ because W^L is an increasing function of $f_1(\mathbf{C})$ and W^R is an increasing function of $f_2(\mathbf{C})$. By combining this with Proposition 2.4, we obtain the result. □

B.6. Proof of Proposition 2.6

First, we prove the following lemma.

Lemma. Suppose that $\frac{\bar{\omega}}{\underline{\omega}} > 12$. Let H be the set of issues to which the highest amount of campaign spending is devoted. Then, both media outlets choose the reporting ratio so that $n_h = 1, h \in H$.

In the following, we show that the viewing time derived from g^4 by choosing $n_h = 1$ is always larger than other groups' possible total viewing time. Note that the viewing utility of g^4 is

$$v^4 = [n_1(1/3 + f_1(\mathbf{C})) + n_2(1/3 + f_2(\mathbf{C})) + n_3(1/3 + f_3(\mathbf{C}))]t - \frac{t^2}{2}. \tag{2.59}$$

By differentiating v^4 with respect to t, we have $t^4 = n_1(1/3 + f_1(\mathbf{C})) + n_2(1/3 + f_2(\mathbf{C})) + n_3(1/3 + f_3(\mathbf{C}))$. Let $H = \{h | f_h(\mathbf{C}) \in \max\{f_1(\mathbf{C}), f_2(\mathbf{C}), f_3(\mathbf{C})\}\}$. If a media outlet chooses $n_h = 1$, at least half of g^4 would choose this outlet. The reason is as follows. Since $n_h = 1$ maximizes their viewing utility, if only one outlet chooses $n_h = 1$, all voters in g^4 choose the outlet. However, if both outlets choose $n_h = 1$, voters in g^4 are divided by one-half. Since $f_h(\mathbf{C}) \in \max\{f_1(\mathbf{C}), f_2(\mathbf{C}), f_3(\mathbf{C})\}$, $f_h(\mathbf{C})$ must be more than or equal to 1/3. Therefore, the viewing time derived from g^4 by choosing $n_h = 1$ is at least $\frac{\bar{\omega}(1/3+1/3)}{2} = \frac{\bar{\omega}}{3}$.

Next, we calculate the possible amount of viewing time of other groups. Suppose that g^1, g^2, g^3 choose the same outlet. Then, the viewing time of g^1, g^2, g^3 can be written as

$$t^1 = n_1(\bar{\theta} + f_1(\mathbf{C})) + n_2(\underline{\theta} + f_2(\mathbf{C})) + n_3(\underline{\theta} + f_3(\mathbf{C})). \tag{2.60}$$

$$t^2 = n_1(\underline{\theta} + f_1(\mathbf{C})) + n_2(\bar{\theta} + f_2(\mathbf{C})) + n_3(\underline{\theta} + f_3(\mathbf{C})). \tag{2.61}$$

$$t^2 = n_1(\underline{\theta} + f_1(\mathbf{C})) + n_2(\underline{\theta} + f_2(\mathbf{C})) + n_3(\bar{\theta} + f_3(\mathbf{C})). \tag{2.62}$$

Therefore, the total viewing time derived from g^1, g^2, g^3 can be calculated as

$$\underline{\omega}[\bar{\theta} + 2\underline{\theta} + 3n_1 f_1(\mathbf{C}) + 3n_2 f_2(\mathbf{C}) + 3n_3 f_3(\mathbf{C})]. \tag{2.63}$$

This can be maximized when one of the issues $k \in \{1, 2, 3\}$ has $f_k(\mathbf{C}) = 1$ and $n_k = 1$. Therefore, the maximum possible viewing time of g^1, g^2, g^3 can be written as

$$\underline{\omega}[\bar{\theta} + 2\underline{\theta} + 3] \Leftrightarrow \underline{\omega}[\bar{\theta} + \frac{2(1-\bar{\theta})}{2} + 3] \Leftrightarrow 4\underline{\omega}. \tag{2.64}$$

Hence, if $\frac{\bar{\omega}}{3} > 4\underline{\omega} \Leftrightarrow \frac{\bar{\omega}}{\underline{\omega}} > 12$, the viewing time derived from g^4 by choosing $n_h = 1$ is always larger than other groups' possible total viewing time. Then, we can check that both outlets always have an incentive to choose $n_h = 1$ and to be chosen by g^4 regardless of the other campaign's spending allocation. There are two cases.

(i) One outlet chooses $n_h \neq 1$ and another outlet chooses $n_h = 1$.

Without loss of generality, suppose that A chooses $n_h \neq 1$ and B chooses $n_h = 1$. In this case, g^4 chooses B. However, if A chooses $n_h = 1$, g^4 would split and A obtain the viewing time from g^4 at least $\frac{\bar{\omega}}{3}$. This must increase the total viewing time of A because $\frac{\bar{\omega}}{3}$ is larger than the possible total viewing time derived from other groups.

(ii) Both outlets choose $n_h \neq 1$.

Suppose that g^4 chooses only one outlet; say, B. Then, if A changes the ratio to $n_h = 1$, g^4 changes its media choice from B to A and A would obtain viewing time from g^4 at least $\frac{2}{3}\bar{\omega}$. This must increase the total viewing time of A because $\frac{2}{3}\bar{\omega}$ is larger than the possible total viewing time derived from other groups.

Next, suppose that g^4 chooses both outlets (split evenly). Then, if one of the outlets, say A, changes the ratio to $n_h = 1$, all voters in g^4 choose A. Therefore, A would increase at least $\frac{\bar{\omega}}{3}$ from g^4. This must increase the total viewing time of A because $\frac{\bar{\omega}}{3}$ is larger than the possible maximum viewing time of other groups.$\square$

We prove Proposition 2.6 by using the Lemma. There are three cases.

(i) $f_k(\mathbf{C}) > f_l(\mathbf{C}), f_m(\mathbf{C})$

Since k is the only issue to which the maximum campaign spending is devoted, by Lemma, it is straightforward that both outlets choose $n_k = 1$.

(ii) $f_k(\mathbf{C}) = f_l(\mathbf{C}) > f_m(\mathbf{C})$

By Lemma, both media outlets have an incentive to choose $n_k = 1$ or $n_l = 1$ to obtain viewing time from g^4. Without loss of generality, suppose that A chooses $n_k = 1$ and B chooses $n_l = 1$. We show that neither party has an incentive to deviate from the reporting ratio that the other outlet chooses. Let us consider the possibility that B deviates to $n_k = 1$. Note that since $n_k = 1$ and $n_l = 1$ are indifferent for g^m and g^4, both groups randomly choose one of each outlet (i.e., both groups are divided by one half). Additionally, g^k chooses A and g^l chooses B. Therefore, the total viewing time for B before deviation can be written as

$$T^B = \underbrace{\frac{1}{2}\bar{\omega}(1/3 + f_l(\mathbf{C}))}_{g^4} + \underbrace{\underline{\omega}(\bar{\theta} + f_l(\mathbf{C}))}_{g^l} + \underbrace{\frac{1}{2}\underline{\omega}(\underline{\theta} + f_l(\mathbf{C}))}_{g^m}. \tag{2.65}$$

If B choose $n_k = 1$, the total viewing time for B would change to

$$T^B = \underbrace{\frac{1}{2}\bar{\omega}(1/3 + f_k(\mathbf{C}))}_{g^4} + \underbrace{\frac{1}{2}\underline{\omega}(\bar{\theta} + f_k(\mathbf{C}))}_{g^k} + \underbrace{\frac{1}{2}\underline{\omega}(\underline{\theta} + f_k(\mathbf{C}))}_{g^l} + \underbrace{\frac{1}{2}\underline{\omega}(\underline{\theta} + f_k(\mathbf{C}))}_{g^m}. \tag{2.66}$$

It is straightforward to check that this cannot increase T^B because $f_k(\mathbf{C}) = f_l(\mathbf{C})$ and $\bar{\theta} > \underline{\theta}$.

(iii) $f_k(\mathbf{C}) = f_l(\mathbf{C}) = f_m(\mathbf{C})$.

In this case, g^4 are indifferent for all issues because $n_k(1/3 + f_k(\mathbf{C})) = n_l(1/3 + f_l(\mathbf{C})) = n_m(1/3 + f_m(\mathbf{C}))$. Therefore, regardless of which ratio each media outlet chooses, g^4 randomly chooses the media outlet and is divided by one-half. Therefore, both media outlets only care about the other three groups. Additionally, note that each g^k chooses the outlet that provides a higher value of n_k because $(\bar{\theta} + f_k(\mathbf{C})) > (\underline{\theta} + f_l(\mathbf{C})) = (\underline{\theta} + f_m(\mathbf{C}))$.

Let $f_k(\mathbf{C}) = f_l(\mathbf{C}) = f_m(\mathbf{C}) = f$. Let us consider the case $n_k^A > n_k^B, n_l^A < n_l^B, n_m^A < n_m^B$. Since g^k chooses A, and g^l, g^m choose B, the total viewing time of A would be

$$T^A = \underbrace{\frac{1}{2}\bar{\omega}(1/3 + f)}_{g^4} + \underbrace{\underline{\omega}[n_k^A(\bar{\theta} + f) + n_l^A(\underline{\theta} + f) + n_m^A(\underline{\theta} + f)]}_{g^k}. \tag{2.67}$$

However, if A chooses $(n_k^{A'}, n_l^{A'}, n_m^{A'})$ so that $n_k^{A'} > n_k^B, n_l^{A'} > n_l^B, n_m^{A'} = 0$, then g^k and g^l

would choose A. Therefore, the total viewing time would increase to

$$
\begin{aligned}
T^A &= \underbrace{\frac{1}{2}\bar{\omega}(1/3+f)}_{g^4} + \underbrace{\underline{\omega}[n_k^{A'}(\bar{\theta}+f) + n_l^{A'}(\underline{\theta}+f)]}_{g^k} + \underbrace{\underline{\omega}[n_k^{A'}(\underline{\theta}+f) + n_l^{A'}(\bar{\theta}+f)]}_{g^l} \\
&= \frac{1}{2}\bar{\omega}(1/3+f) + \underline{\omega}(\bar{\theta}+f) + \underline{\omega}(\underline{\theta}+f). \qquad (2.68)
\end{aligned}
$$

In any case, one of each outlet has an incentive to set the ratio of one issue to 0 and allocate it to the other two issues to obtain two among the three groups (g^1, g^2, g^3). Therefore, there is no equilibrium. $\square$

B.7. Proof of Proposition 2.7

First, we summarize how each group voting behavior changes through the priming effect. By Proposition 2.6, each media outlet chooses $n_1 = 1$, $n_2 = 1$, or $n_3 = 1$ in equilibrium. In the following, we say "voter group g is primed toward issue k" if group g chooses the outlets that report $n_k = 1$.

Before priming, g^1, g^3, g^4 votes for L and g^2 votes for R. Since L has an advantage in issues 1 and 3, if each group is primed toward issue 1 or 3, g^1, g^3, g^4 continues to vote for L but the effect on g^2 is ambiguous. Additionally, since R has an advantage in issue 2, if each group is primed toward issue 2, g^2 continues to vote for R but the effect on g^1, g^3, g^4 is ambiguous. However, as far as $\beta > \frac{q^{**}-1+3K}{2+q^{**}}$ holds, we can check that g^4 votes for L when they are primed toward issue 2. This can be checked as follows. By definition (2.30), if they are primed toward issue 2, salience weights of g^4 would change to

$$s_1^4 = 1/3 - \frac{\beta(1/3 + f_2(\mathbf{C}))}{2}. \qquad (2.69)$$

$$s_2^4 = 1/3 + \beta(1/3 + f_2(\mathbf{C})). \qquad (2.70)$$

$$s_3^4 = 1/3 - \frac{\beta(1/3 + f_2(\mathbf{C}))}{2}. \qquad (2.71)$$

Then, (s_1^4, s_2^4, s_3^4) satisfies $s_2 > q^{**}s_1 + K$, if $\beta > \frac{2(q^{**}-1)+6K}{(2+q^{**})(1+3f_2(\mathbf{C}))}$. By Proposition 2.6, we know that voters are primed toward issue 2 only when $f_2(\mathbf{C}) \geq f_1(\mathbf{C}), f_3(\mathbf{C})$ holds, which means that $f_2(\mathbf{C}) \geq 1/3$. Therefore, as far as $\beta > \frac{q^{**}-1+3K}{2+q^{**}}$ holds, g^4 votes for L when they are primed toward issue 2.

Next, we will show that if $\mathbf{C}_k \geq \mathbf{C}_l$ then $f_k(\mathbf{C}) \geq f_l(\mathbf{C})$. Without loss of generality, suppose that $\mathbf{C}_1 \geq \mathbf{C}_2$, but $f_1(\mathbf{C}) < f_2(\mathbf{C})$ holds. Let permutation be $\pi(1) = 2, \pi(2) = 1, \pi(3) = 3$. Then, by (A3), we have $f_1(\mathbf{C}_1, \mathbf{C}_2, \mathbf{C}_3) < f_2(\mathbf{C}_1, \mathbf{C}_2, \mathbf{C}_3)$ and $f_2(\mathbf{C}_2, \mathbf{C}_1, \mathbf{C}_3) < f_1(\mathbf{C}_2, \mathbf{C}_1, \mathbf{C}_3)$. However, this is a contradiction because (A2) requires $f_2(\mathbf{C}_2, \mathbf{C}_1, \mathbf{C}_3) \geq f_2(\mathbf{C}_1, \mathbf{C}_2, \mathbf{C}_3)$ and $f_1(\mathbf{C}_1, \mathbf{C}_2, \mathbf{C}_3) \geq f_1(\mathbf{C}_2, \mathbf{C}_1, \mathbf{C}_3)$. In the same way, we can check that if $\mathbf{C}_k > \mathbf{C}_l$ then $f_k(\mathbf{C}) > f_l(\mathbf{C})$.

In the following, we will show that in equilibrium, $f_1(\mathbf{C}) = f_2(\mathbf{C}) > f_3(\mathbf{C})$ or $f_2(\mathbf{C}) = f_3(\mathbf{C}) > f_1(\mathbf{C})$ must hold. We will show that at least one of each party has an incentive to deviate in the following three cases.

(i) $f_2(\mathbf{C}) < f_1(\mathbf{C})$ or $f_2(\mathbf{C}) < f_3(\mathbf{C})$

By Proposition 2.6, each media outlet must choose $n_1 = 1$ or $n_3 = 1$. Since voters are primed toward issue 1 or 3, at least g^1, g^3, g^4 continue to vote for L. Note that if $C_2^R = I$ then $f_2(\mathbf{C}) \geq f_1(\mathbf{C}), f_3(\mathbf{C})$ because $\mathbf{C}_1, \mathbf{C}_3$ cannot be more than I. Therefore, $C_2^R < I$ holds. Suppose that R deviates from $C_2^R = I$. Then, $f_2(\mathbf{C}) \geq f_1(\mathbf{C}), f_3(\mathbf{C})$ holds, and by Proposition 2.6, at least one media outlet chooses $n_2 = 1$. In this case, g^2 and at least half of g^4 are primed toward issue 2 and vote for R, which increases the vote share of R. Therefore, R has an incentive to deviate.

(ii) $f_1(\mathbf{C}), f_3(\mathbf{C}) < f_2(\mathbf{C})$

By Proposition 2.6, each media outlet must choose $n_2 = 1$. Since voters are primed toward issue 2, at least g^2 and g^4 vote for R. By the same logic as (i), now $C_1^L < I$ and $C_3^L < I$ hold. Let us consider the case where L deviates from $C_1^L = I$. Then, $f_1(\mathbf{C}) \geq f_2(\mathbf{C}), f_3(\mathbf{C})$, and by Proposition 2.6, at least one of the media outlets chooses $n_1 = 1$. In this case, g^1 and at least half of g^3, g^4 would change media outlets and are primed toward issue 1. Since at least half of g^4 change their voting from R to L and it is impossible for other groups to change voting from L to R, the deviation increases the vote share for L. Hence, L has an incentive to deviate. The case where L deviates from $C_3^L = I$ leads to the same result.

(iii) $f_1(\mathbf{C}) = f_2(\mathbf{C}) = f_3(\mathbf{C}) = 1/3$

By the same logic as (i) and (ii), L has an incentive to change campaign spending so that $f_1(\mathbf{C}) > f_2(\mathbf{C}), f_3(\mathbf{C})$ or $f_3(\mathbf{C}) > f_1(\mathbf{C}), f_2(\mathbf{C})$, and R has an incentive to change campaign spending so that $f_2(\mathbf{C}) > f_1(\mathbf{C}), f_3(\mathbf{C})$. Therefore, this cannot be an equilibrium.

Then, $f_1(\mathbf{C}) = f_2(\mathbf{C}) > f_3(\mathbf{C})$ or $f_2(\mathbf{C}) = f_3(\mathbf{C}) > f_1(\mathbf{C})$ must hold. Note that in the first case, one media outlet chooses $n_1 = 1$ and another outlet chooses $n_2 = 1$. As a result, g^1 and half of g^3, g^4 are primed toward issue 1, and g^2 and half of g^3, g^4 are primed toward issue 2. The same logic can be applied in the second case. In each case, if $C_2^R < I$, R has an incentive to choose $C_2^R = I$ and increase $f_2(\mathbf{C})$. Then, by Proposition 2.6, all voters are primed toward issue 2, so R can increase vote share. Therefore, $C_2^R = I$ must hold in equilibrium. Then, if $C_1^L < I$ and $C_3^L < I$, $f_1(\mathbf{C}) = f_2(\mathbf{C}) > f_3(\mathbf{C})$ and $f_2(\mathbf{C}) = f_3(\mathbf{C}) > f_1(\mathbf{C})$ cannot be the case. Therefore, in equilibrium, L must choose $(C_1^{L*}, C_2^{L*}, C_3^{L*}) = (I, 0, 0)$ or $(C_1^{L*}, C_2^{L*}, C_3^{L*}) = (0, I, 0)$ and R must choose $(C_1^{R*}, C_2^{R*}, C_3^{R*}) = (0, I, 0)$. Combining the result with Proposition 2.6 leads to Proposition 2.7. $\square$

B.8. Proof of Proposition 2.8

Suppose that *Case S* holds in Stage 2. In the following, we solve the optimization problems for each party in Stage 1 and show that under this equilibrium, both outlets have no incentive to deviate from *Case S*. First, we show that the equilibrium must satisfy both $\Sigma_P C_1^P > 0$ and $\Sigma_P C_2^P > 0$. If $\Sigma_P C_1^P > 0, \Sigma_P C_2^P = 0$, then the party that devotes its campaign spending to issue 1 has an incentive to decrease spending because this deviation would not change the vote share. The case $\Sigma_P C_1^P = 0, \Sigma_P C_2^P > 0$ also cannot be an equilibrium for the same reason. If $\Sigma_P C_1^P = \Sigma_P C_2^P = 0$, L always has an incentive to deviate. To see this, note that the vote share of L when $\Sigma_P C_1^P = \Sigma_P C_2^P = 0$ can be written as follows.

$$W^L = \begin{cases} \frac{\beta}{2(1+\beta)} + \frac{1-\beta-q^*}{1+\beta} & \text{if } q^* < \frac{1}{2} - \beta. \\ \frac{1}{2} & \text{if } q^* \geq \frac{1}{2} - \beta. \end{cases} \tag{2.72}$$

If L increases its campaign spending on issue 1 by a small ϵ, both media outlets choose $(1,0)$. By this deviation, W^L becomes the following.

$$W^L = \begin{cases} 1 & \text{if } q^* < \beta. \\ 1 + \frac{\beta-q^*}{1+\beta} & \text{if } q^* \geq \beta. \end{cases} \tag{2.73}$$

If W^L changes to 1, it is clear that L has an incentive to deviate. Additionally, L has an incentive to deviate if W^L becomes $1 + \frac{\beta-q^*}{1+\beta}$ because

$$\begin{aligned} \frac{\beta}{2(1+\beta)} + \frac{1-\beta-q^*}{1+\beta} &< 1 + \frac{\beta-q^*}{1+\beta} \\ &\Leftrightarrow 0 < \beta. \end{aligned} \tag{2.74}$$

Since $\beta \in (0,1)$, this inequality holds. Therefore, if $\Sigma_P C_1^P = \Sigma_P C_2^P = 0$, there is no equilibrium.

In the following, suppose that $\Sigma_P C_1^P > 0$ and $\Sigma_P C_2^P > 0$. There are three cases.

(i) $q^* < f_2(\mathbf{C}^*) - \beta$.

In this case, the utility of each party can be written as follows.

$$u^L = \frac{\beta}{1+\beta} f_1(\mathbf{C}) + \frac{1-\beta-q^*}{1+\beta} - \frac{(C_1^L)^2}{2} - \frac{(C_2^L)^2}{2}. \tag{2.75}$$

$$u^R = 1 - \frac{\beta}{1+\beta} f_1(\mathbf{C}) - \frac{1-\beta-q^*}{1+\beta} - \frac{(C_1^R)^2}{2} - \frac{(C_2^R)^2}{2}. \tag{2.76}$$

u^L is strictly quasi-concave in C_1 and u^R is strictly quasi-concave in C_2. By differentiating these functions by (C_1^L, C_2^L) and (C_1^R, C_2^R), we have

$$\frac{\partial u^L}{\partial C_1^L} = \frac{a\beta(\Sigma_P C_1^P)^{a-1}(\Sigma_P C_2^P)^a}{(1+\beta)[(\Sigma_P C_1^P)^a + (\Sigma_P C_2^P)^a]^2} - C_1^L. \tag{2.77}$$

$$\frac{\partial u^L}{\partial C_2^L} = -\frac{a\beta(\Sigma_P C_1^P)^{a}(\Sigma_P C_2^P)^{a-1}}{(1+\beta)[(\Sigma_P C_1^P)^a + (\Sigma_P C_2^P)^a]^2} - C_2^L. \tag{2.78}$$

$$\frac{\partial u^R}{\partial C_1^R} = -\frac{a\beta(\Sigma_P C_1^P)^{a-1}(\Sigma_P C_2^P)^a}{(1+\beta)[(\Sigma_P C_1^P)^a + (\Sigma_P C_2^P)^a]^2} - C_1^R. \tag{2.79}$$

$$\frac{\partial u^R}{\partial C_2^R} = \frac{a\beta(\Sigma_P C_1^P)^{a}(\Sigma_P C_2^P)^{a-1}}{(1+\beta)[(\Sigma_P C_1^P)^a + (\Sigma_P C_2^P)^a]^2} - C_2^R. \tag{2.80}$$

Since $\frac{\partial u^L}{\partial C_2^L} < 0$ and $\frac{\partial u^R}{\partial C_1^R} < 0$, $C_2^{L*} = C_1^{R*} = 0$. The first-order conditions require

$$\frac{a\beta(\Sigma_P C_1^P)^{a-1}(\Sigma_P C_2^P)^a}{(1+\beta)[(\Sigma_P C_1^P)^a + (\Sigma_P C_2^P)^a]^2} = C_1^L \quad \text{and} \quad \frac{a\beta(\Sigma_P C_1^P)^{a}(\Sigma_P C_2^P)^{a-1}}{(1+\beta)[(\Sigma_P C_1^P)^a + (\Sigma_P C_2^P)^a]^2} = C_2^R. \tag{2.81}$$

By these conditions, $C_1^{L*} = C_2^{R*} = \frac{1}{2}\sqrt{\frac{a\beta}{1+\beta}}$ holds. Since $f_1(\mathbf{C}^*) = f_2(\mathbf{C}^*) = 1/2$, $C_1^{L*} = C_2^{R*} = \frac{1}{2}\sqrt{\frac{a\beta}{1+\beta}}$ is a potential equilibrium as far as $q^* < 1/2 - \beta$.

(ii) $q^* > f_2(\mathbf{C}^*) - \beta$.

In this case, the utility of each party can be written as follows.

$$u^L = f_1(\mathbf{C}) - \frac{(C_1^L)^2}{2} - \frac{(C_2^L)^2}{2}. \tag{2.82}$$

$$u^R = 1 - f_1(\mathbf{C}) - \frac{(C_1^R)^2}{2} - \frac{(C_2^R)^2}{2}. \tag{2.83}$$

u^L is strictly quasi-concave in C_1 and u^R is strictly quasi-concave in C_2. By differentiating these functions by (C_1^L, C_2^L) and (C_1^R, C_2^R), we have

$$\frac{\partial u^L}{\partial C_1^L} = \frac{a(\Sigma_P C_1^P)^{a-1}(\Sigma_P C_2^P)^a}{[(\Sigma_P C_1^P)^a + (\Sigma_P C_2^P)^a]^2} - C_1^L. \tag{2.84}$$
$$\frac{\partial u^L}{\partial C_2^L} = -\frac{a(\Sigma_P C_1^P)^{a}(\Sigma_P C_2^P)^{a-1}}{[(\Sigma_P C_1^P)^a + (\Sigma_P C_2^P)^a]^2} - C_2^L. \tag{2.85}$$
$$\frac{\partial u^R}{\partial C_1^R} = -\frac{a(\Sigma_P C_1^P)^{a-1}(\Sigma_P C_2^P)^a}{[(\Sigma_P C_1^P)^a + (\Sigma_P C_2^P)^a]^2} - C_1^R. \tag{2.86}$$
$$\frac{\partial u^R}{\partial C_2^R} = \frac{a(\Sigma_P C_1^P)^{a}(\Sigma_P C_2^P)^{a-1}}{[(\Sigma_P C_1^P)^a + (\Sigma_P C_2^P)^a]^2} - C_2^R. \tag{2.87}$$

Since $\frac{\partial u^L}{\partial C_2^L} < 0$ and $\frac{\partial u^R}{\partial C_1^R} < 0$, $C_2^{L*} = C_1^{R*} = 0$. The first-order conditions require

$$\frac{a(\Sigma_P C_1^P)^{a-1}(\Sigma_P C_2^P)^a}{[(\Sigma_P C_1^P)^a + (\Sigma_P C_2^P)^a]^2} = C_1^L \quad \text{and} \quad \frac{a(\Sigma_P C_1^P)^{a}(\Sigma_P C_2^P)^{a-1}}{[(\Sigma_P C_1^P)^a + (\Sigma_P C_2^P)^a]^2} = C_2^R. \tag{2.88}$$

By these conditions, $C_1^{L*} = C_2^{R*} = \frac{\sqrt{a}}{2}$ holds. Since $f_1(\mathbf{C}^*) = f_2(\mathbf{C}^*) = 1/2$, $C_1^{L*} = C_2^{R*} = \frac{\sqrt{a}}{2}$ is a potential equilibrium as far as $q^* > 1/2 - \beta$.

(iii) $q^* = f_2(\mathbf{C}^*) - \beta$.

In this case, C_1^{L*} must satisfy $\frac{\partial f_1(\mathbf{C})}{\partial C_1^L} \leq C_1^L$ and $\frac{\beta}{1+\beta}\frac{\partial f_1(\mathbf{C})}{\partial C_1^L} \geq C_1^L$.[37] These inequalities cannot hold simultaneously, so there is no equilibrium that satisfies $q^* = f_2(\mathbf{C}^*) - \beta$.

Finally, there is no subgame perfect Nash equilibrium in *Case B1* or *Case B2*. The first-order condition of each party requires that $\Sigma_P C_1^P = \Sigma_P C_2^P$, so $f_1(\mathbf{C}^*) = f_2(\mathbf{C}^*) = \frac{1}{2}$ must hold in equilibrium. By Proposition 2.1, if $\frac{\sqrt{15}-3}{2} \leq f_1(\mathbf{C}) \leq \frac{5-\sqrt{15}}{2}$ holds, then both outlets do not have an incentive to deviate to *Case B1* or *Case B2*. This means that *Case B1* or *Case B2* cannot be the case in equilibrium. □

[37] The same argument holds for C_2^{R*}.

3 Issue selection, inequality, and polarization of social ideologies

3.1 Introduction

In an election, one of the central strategies of political parties is to address key political issues for voters. Since voters' priorities among political issues are malleable, politicians sometimes attempt to manipulate voters' priorities through political campaigns and attract attention to an issue they want to play a key role in an election. The most influential view is *issue ownership theory*, which states that political parties have an advantage on a certain issue due to their accumulated reputation/expertise (Petrocik, 1996). Then, the theory argues that each party has an incentive to emphasize the issue that the party has an issue ownership. For example, Petrocik et al. (2003) analyze campaign issues in U.S. presidential elections from 1952-2000 and show that Democrats tend to emphasize social welfare, education, and civil rights issues through political campaigns, while Republicans tend to emphasize national defense, religion, morality, and crime issues.

One of the key questions in this regard is how parties' political communication affects issue salience and interacts with their policy platforms. For example, in the U.S., Republicans sometimes emphasize religious issues such as abortion and same-sex marriage. A typical example is Ronald Reagan's campaign in the 1980 election and George W. Bush's campaign in the 2004 U.S. presidential election, both of which aimed to appeal to evangelicals. In this context, the often-held view is that the right-wing party's strategy to increase the salience of religious issues diverts the attention of low-income voters away from economic concerns and towards religious issues, potentially pushing economic policy to the right (Roemer, 2001). However, even if this observation holds some truth, there are currently few theoretical models to explain the interaction between parties' political communication, voters' issue salience, and policy platforms.

The primary objective of this study is to elucidate the interaction between the strategies employed by political parties in selecting issues, issue salience, and policy platforms, particularly from the perspective of income inequality and polarization of social ideologies. To achieve this goal, we develop an issue selection model for liberal and conservative parties with fixed social ideological positions and explore how their issue selection strategies interact with their economic distribution policy (e.g., tax rate).

Subsequently, we demonstrate that as the social ideologies become polarized, both parties attempt to manipulate the salience weights of low-income/conservative voters (Proposition 3.1 (i)). In this equilibrium, the left party emphasizes the importance of the economic distribution problem, while the right party emphasizes the significance of social issues to attract the attention of low-income/conservative voters. Low-income/conservative voters play a crucial role in two ways. Firstly, they are considered *swing voters*, as they tend to lean towards left-wing parties on economic issues but lean towards right-wing parties in terms of social ideology. As a result, changes in salience weight dramatically affect the voting behavior of *swing voters*, driving both parties to focus on this group in a political campaign. Secondly, the influence of low-income swing voters intensifies more than that of high-income swing voters because of its size (there are more low-income voters than high-income voters).

Within this equilibrium, the model demonstrates that the *issue bias*, representing the relative campaign effectiveness in attracting voters' attention toward a specific issue, determines the direction of both parties' tax proposals (Proposition 3.2). The equilibrium reveals that when the *issue bias* leans towards shifting voters' salience weight toward a social issue such as abortion and same-sex marriage, both parties are more likely to advocate for tax reductions, thereby contributing to the escalation of income inequality.

The rationale behind this result is as follows: In the context of polarization of social ideologies, both parties seek to manipulate the salience weights of low-income/conservative voters and to allocate their budgets to attract their attention toward the opposite direction (economic issue/social issue). If there is no *issue bias*, these effects cancel out because we assume that the parties' abilities to manipulate voters' salience weights are equal. In contrast, when there is an *issue bias* favoring a social issue (e.g., media outlets are inclined to report more on social issues), this amplifies the effect of the right party's political campaign, making low-income/conservative voters shift their attention towards a social issue. Meanwhile, high-income voters tend to maintain their prior salience weights relatively unchanged. Consequently, both parties adjust their proposed tax rates to cater to the demands of high-income voters, who place relatively higher salience on economic issues.

In this study, we make two main contributions. First, we explicitly incorporate the issue selection strategy into the context of two-dimensional political competition between parties with fixed ideological positions over income distribution problems such as Krasa and Polborn

(2014).[38] This allows us to investigate how parties' issue selection strategies affect issue salience and interact with their tax policy proposals, a perspective not explored in previous research. Secondly, our model offers a potential explanation for why political parties appear to be reluctant to address the issue of growing income inequality from the viewpoint of issue salience, which is determined endogenously in our model.

Related literature

The most related research topic to the current study is the issue selection model that has been used to investigate parties' strategies to capture the voters' attention for each issue through a political campaign. Petrocik (1996) is a pioneering contribution to this subject. Petrocik's issue ownership theory argues that if a party has a reputation for greater competence in handling an issue, it emphasizes that issue while another party abandons it. Following Petrocik (1996), several researchers have studied the issue selection strategy of political parties by using a formal framework. Examples include Amorós and Puy (2013), Aragonès et al. (2015), Dragu and Fan (2016), Denter (2020), and Aragonès and Ponsatí (2022). By using a game-theoretic approach, they analyze issue selection strategy with endogenous issue weights. For example, Aragonès et al. (2015) develop an issue selection model that considers investment in policy qualities. In their model, parties decide a communication time to attract voters' attention and determine the amount of investment to improve their policy qualities. By using this setting, Aragonès et al. (2015) reveal the condition under which parties focus on their historically strong issues or attempts to steal the opponents' issues during the campaign. Denter (2020) analyzes a model in which parties' campaign effort simultaneously affects voters' attention (priming) and policy quality (persuasion). Denter (2020) reveals that considering both effects of campaign effort can fill the gap between theoretical and empirical research, i.e., why issue overlap occurs in real politics.[39] In contrast to these papers, in the current study an issue selection model between two parties with fixed ideological positions on income distribution problems is developed, and how political campaigns interact with policy platforms is investigated. Unlike Aragonès et al. (2015), for example, parties propose vertically differentiated platforms (tax rates), and we investigate

[38] We discuss the difference between our model and Krasa and Polborn (2014) in Section 3.4.

[39] There is also abundant empirical literature in this field. Examples include Petrocik et al. (2003), Sigelman and Buell Jr (2004), Damore (2005), Kaplan et al. (2006), Bélanger and Meguid (2008), Green and Hobolt (2008), Green-Pedersen and Mortensen (2015), and Kiousis et al. (2015). In these empirical papers, how political parties choose issues in an election is investigated based on issue ownership theory, and how this strategy affects voters' choices is also discussed.

how those platforms and parties' issue selection strategies interact with each other and the resulting implications for income distribution.

Another related literature is empirical research investigating the media's role in an agenda-setting context. As explained above, our main result (Proposition 3.2) states that the direction of tax policy is determined through the *issue bias*, which amplifies the effect of parties' political campaigns. One interpretation is that the *issue bias* stems from the media outlets' choice of news content.[40] For example, if media outlets perceive a social issue as more controversial and, therefore, more attractive as news content to maximize their audience or readership, they may report more on that social issue than on economic issues. In the field of media studies, there is substantial evidence that voters obtain their political information through media reporting, and issue salience is influenced by media emphasis (Iyengar and Kinder, 2010; McCombs and Valenzuela, 2020; King et al., 2017) and the interaction with candidates' message (Dalton et al., 1998). For example, one experiment in Iyengar and Kinder (2010) compared the treatment group to the control group, who viewed the news program that emphasized defense preparedness. The results reveal that the change in the treatment group's salience of the defense preparedness issue was significantly higher than that of the control group. Another study, King et al. (2017), a field experiment was conducted by recruiting small media outlets and by making them publish simultaneous stories in a specific week. Then, by comparing the outcomes of the treatment week and control week, King et al. (2017) show that the intervention increased the discussion of this subject on Twitter by more than 60 percent. As we discuss in Section 3.2, even though we do not explicitly incorporate media outlets into our model, the assumption of *issue bias* is based on those findings from the field of media studies.[41]

Complementary to our approach, there is some literature in which how ideological positions on social issues affect parties' tax policies is investigated, even though they do not focus on the issue salience/issue selection strategy of parties.[42] For example, Krasa and Polborn

[40]The terminology originates from Baum and Gussin (2005).

[41]There is also a literature that delves into the theoretical exploration of how media outlets' behavior influences issue salience. For instance, Yamaguchi (2022) investigates the interplay between media outlets' behavior and parties' issue selection, operating under the assumption that media outlets prioritize reporting on issues that maximize their profitability. Within this framework, media outlets tend to emphasize issues that garner more attention from consumers, potentially resulting in an unequal focus on specific topics.

[42]Roemer (1998) investigates political competition over tax policy and social ideology, similar to our model. He reveals that when voters' attention is drawn to social issues such as religion, there exists an equilibrium in which both parties propose laissez-faire economic policies, despite the majority of voters (low-income voters) demanding redistributive fiscal policies. However, Roemer (1998) assumes that issue salience is exogenously determined, which significantly differs from our approach.

(2014) show how social ideologies affect the party's tax policy, by using the "differentiated candidates framework"—candidates have differentiated production technology for public goods. Then, Krasa and Polborn (2014) show that changes in social (cultural) policy affect tax policy proposals. For example, when the average swing voter type is socially conservative, the polarization of platforms in social ideologies leads to a higher tax rate. In a technical sense, Krasa and Polborn (2010a) is also close to the current study. Krasa and Polborn (2010a) assume that office-motivated candidates are exogenously committed to specific positions on some issues and choose policy proposals from a binary domain. Then, they show how the distribution of swing voters affects parties' policy proposals. Similar to Krasa and Polborn (2010a), we also use the binary domain assumption for tax rate proposals and fixed ideological positions.

Before proceeding to the model, we explain the definition of "social issues" in this study. In this study, we use the term "social issues" to refer to issues unrelated to redistributive, class-based (low-income/high-income) politics. A typical example is religious problems, such as abortion and same-sex marriage. As we see later, on the one hand there is a weak relationship between religious belief and income, so the voting decision on religious matters is not absorbed into a class-based vote decision. On the other hand, immigration and race are more class-based and relate to the income inequality problem (McCarty et al., 2016). Therefore, although immigration and race have social/cultural aspects, we do not include them among social issues.

The remainder of this chapter proceeds as follows. In Section 3.2, we develop the issue selection model and explain the characteristics of the political campaign and its effect on issue salience. Section 3.3 provides the equilibria of the party's issue selection and policy proposal stages. In Section 3.4, we discuss the implications and the testable hypothesis of the model. Section 3.5 presents the conclusion, and we discuss the directions for future research.

3.2 Model

There are two categories of players: parties and voters. The policy space is two-dimensional, encompassing an economic issue (tax policy) and a social issue. Political parties choose tax policy while they are exogenously committed to an ideological position on social issues. In Stage 1, political parties propose their tax policy. In Stage 2, they select their message, deciding whether to emphasize an economic or a social issue. Moving to Stage 3, political parties determine their campaign spending (advertising) to underscore their message toward a specific type of voters and influence their prioritization of political issues. In Stage 4, voters cast their votes based on the salience weights established during the issue selection stage (Stages 2 and 3). In the following subsections, we provide a detailed explanation of the behavior of each player.

3.2.1 Political parties

There are two office-motivated parties $P \in \{L, R\}$, where L means the left (liberal) party and R means the right (conservative) party. We assume that the objective of the political parties is winning probability maximization. The policy space is two-dimensional, consisting of an economic issue (tax policy) and a social issue. Examples of social issues are religious issues such as abortion, same-sex marriage, and school prayer. Social ideological position is denoted as $\rho \in \{\rho^-, \rho^+\}$, where ρ^- is interpreted as liberal position and ρ^+ as conservative position. Without loss of generality, we assume that $\rho^- < \rho^+$.

In this model, we employ two simplifying assumptions. Firstly, political parties propose tax policies $t \in [0, 1]$ within a binary domain, similar to in Krasa and Polborn (2010a). We assume that $t_L \in \{\underline{t}_L, \bar{t}_L\}$ and $t_R \in \{\underline{t}_R, \bar{t}_R\}$, where $\underline{t}_R < \underline{t}_L < \bar{t}_R < \bar{t}_L$. This assumption implies that the liberal party can credibly propose a higher tax rate (inequality-reduced policy) than can the conservative party due to its history or party label, and conversely, the conservative party can commit a lower tax rate (laissez-faire policy).

Secondly, we posit that political parties are committed to fixed ideological positions on social issues due to their historical backgrounds or party labels, which is similar to Krasa and Polborn (2014). In this model, we assume that L represents a liberal position (ρ^-), while R reflects a conservative position (ρ^+). This contrasts with Aragonès et al. (2015), which endogenizes the difference in policy positions by assuming that the party can invest in policy proposal quality (vertical differentiation). By contrast, assuming exogenously fixed ideological positions, we can investigate the interplay between political campaigns (Stages 2 and 3), issue salience, and horizontally differentiated policy proposals (tax rates), which are understudied in the related literature.

After the policy proposal stage, political parties send a message that represents which issue is more important in an election. The message sent by party P is represented as $m_P \in \{-1, 1\}$, where $m = 1$ means "economic issue (tax rate) is more important", while $m = -1$ means "social issue is more important". Also, parties can invest in campaign spending within a budget constraint to amplify the effect of their message toward a specific type of voter (*targeting*). We suppose that the campaign budget of each party is 1, and their campaign spending toward voter type v_i^j (as explained in the next subsection) is represented as $C_{i,P}^j$, which we explain in detail in Section 3.2.3.

Parties' messages and campaign spending affect voters' salience weight in each issue. This framework depends on the assumption that voters' priorities for political issues are malleable and primed by politicians' cues (*priming effect*). This assumption is widely used in several studies, such as Amorós and Puy (2013), Aragonès et al. (2015), Dragu and Fan (2016), and Denter (2020).

The objective of each party is to maximize winning probability subject to a campaign budget. The optimization problem of party P can be written as

$$\begin{aligned} \max \quad & W_P(t_L, t_R, m_L, m_R, C_L, C_R; \rho_L, \rho_R) \\ \text{s.t.} \quad & \Sigma_i \Sigma_j C_{i,P}^j \leq 1, \end{aligned} \tag{3.1}$$

where W_P is the winning probability of party P and C_P is a vector of campaign spending of party P. We note that ρ_L, ρ_R are the exogenous parameters in this setting.

3.2.2 Voters

There is a continuum number of voters, and the size is normalized to one. Voters groups are differentiated by their income and preferences on social issues. There are two types of incomes $\omega \in \{\omega_l, \omega_h\}$, where $\omega_l < \omega_h$ and l means low-income and h means high-income. There are two views on social issues, $\rho \in \{\rho^-, \rho^+\}$, which coincide with political parties' ideological positions. The share of each type is denoted as $\mu_i, i \in \{l, h\}$ and $\mu^j, j \in \{-, +\}$. In the following analysis, we assume that $\mu_l > \frac{1}{2}$, which means that the mean income is higher than the median income, which can be seen in most developed countries. Also, for the simplification, we assume that $\mu^+ = \mu^- = 1/2$, meaning that neither ideological position has superiority over the other.

There are four types of voters, $\omega_l \times \rho^+$ (low-income/conservative), $\omega_l \times \rho^-$ (low-income/liberal), $\omega_h \times \rho^+$ (high-income/conservative), and $\omega_h \times \rho^-$ (high-income/liberal). We denote each voter type as $v_i^j, i \in \{l, h\}, j \in \{-, +\}$. The share of each voter type is denoted as μ_i^j. We assume that income and the position of social ideology are independent, i.e., $\mu_i^j = \mu_i \times \mu^j$. This assumption may appear strong, but it reflects the reality of the relationship between income and religious belief. For example, McCarty et al. (2016) show that there is only an approximately \$16,000 average difference between the family incomes of born-again respondents and other respondents, and about half of the difference can be explained by demographic factors such as region, age, gender, and education. This means that the relationship between income and religious belief is weak.

Also, in each group v_i^j, $i \in \{l, h\}$ and $j \in \{-, +\}$, voters are differentiated by idiosyncratic affinities, which we see in Section 3.3.1. Since voters are differentiated within the same group v_i^j, we denote each voter as k in group v_i^j.

We assume that each group of voters has a common prior relative salience weight $\theta \in (0, 1)$, where θ is a prior salience weight on the economic issue and $1 - \theta$ is a prior salience weight on the social issue. The prior salience weight represents the relative importance of the issue for each group of voters before being affected by the parties' issue selection (Stages 2 and 3).

Voters vote for the party that proposes the most preferred policy. The payoff function of voter in group v_i^j is defined as

$$v_i^j(t, m, C; \rho) = s_i^j(m, C)[(1-t)\omega_i + t\omega^*] - [1 - s_i^j(m, C)](\rho - \rho^j)^2, \tag{3.2}$$

where ω^* is average income, i.e., $\omega^* = \mu_l\omega_l + \mu_h\omega_h$, and $t = (t_L, t_R)$, $m = (m_L, m_R)$, $C = (C_L, C_R)$, and $\rho = (\rho_L, \rho_R)$. $s(m, C)$ is a voter's posterior salience weight on economic issues, and $1 - s(m, C)$ is a voter's posterior salience weight on the social issue, which we see later. The representation $(1-t)\omega_i + t\omega^*$ means that tax income from high-income voters is directly redistributed to low-income voters. Therefore, low-income voters prefer a higher tax rate, while high-income voters prefer a lower tax rate.

3.2.3 Salience weights and campaign spending

Next, we explain the formal definition of the posterior salience weight $s_i^j(m, C)$. Voter v_i^j's posterior salience weight $s_i^j(m, C)$ is defined as

$$s_i^j(m, C) = \Sigma_P f_{i,P}^j(m_P, C_P) + \theta, \tag{3.3}$$

where $f^j_{i,P}(m_P, C_P)$ is a party P's message/campaign effect for the salience weights of v^j_i. Therefore, this functional form means that voters' posterior salience weight is determined as a combination of the parties' message/campaign effect and prior salience weight θ.

Parties message/campaign effect $f^j_{i,P}(m_P, C_P)$ is defined as follows.

$$f^j_{i,P}(m_P, C_P) = \begin{cases} \beta(1 + C^j_{i,P})m_P & \text{if } m_P = 1. \\ \alpha\beta(1 + C^j_{i,P})m_P & \text{if } m_P = -1. \end{cases} \tag{3.4}$$

This function describes the relative impact of each party's message and campaign spending on capturing the attention of voters v^j_i toward a specific issue.[43] The crucial point is that the impact is asymmetric depending on the message m_P, which is represented by the parameter $\alpha > 0$. In this definition, α captures the *issue bias*, representing the effectiveness of a message/campaign in emphasizing the importance of a particular issue during the electoral campaign. To simplify the discussion, we assume that $\alpha \neq 1$, indicating that we exclude the case where there is no *issue bias*.

One interpretation of *issue bias* is media-induced bias. For example, if media outlets perceive a social issue as more controversial and, therefore, more attractive as news content to maximize their audience or readership, they may report more on that social issue than on economic issues. Le us suppose one party (say L) emphasizes an economic issue, while another party (say R) emphasizes a social issue during a campaign. Since *issue bias* amplifies the campaign effect of R, the effect of R's campaign may outweigh that of L. As a result, voters' salience weights are more inclined toward a social issue.

The weight $\beta \in (0, 1)$ represents the priming effect of a message/electoral campaign. A higher value of β indicates that voters are more influenced by parties' political campaigns, whereas a lower value suggests the opposite. We assume that β is small enough so that $s^j_i(m, C) \in (0, 1)$ holds.

Furthermore, in this formulation, we assume that political parties allocate campaign spending toward specific types of voters, represented by $C^j_{i,P}$. After political parties send their message $m_P \in \{-1, 1\}$, they can also choose to target specific voters, with the aim of amplifying the effect of their message. For example, if a candidate wants to influence the salience weights of

[43] Alternatively, we can formalize the campaign effect by using the contest success function, such as Denter (2020). However, we do not employ this formalization to avoid complexity.

low-income/conservative voters, they can allocate their budget to advertising tailored to attract this type of voter. This strategy is similar to *micro-targeting*, which refers to the practice of political candidates narrowly targeting voters based on these characteristics by utilizing new technologies (Prummer, 2020).

We note that in this specification, it is possible that even when both parties choose the same message, they may target different groups of voters to maximize their winning probability. For example, both parties may emphasize a social issue in a campaign, with L targeting high-income/liberal voters and R targeting low-income/conservative voters. This setting allows both parties to emphasize the same issue, which is called *issue convergence* (Amorós and Puy, 2013; Damore, 2005; Kaplan et al., 2006; Sigelman and Buell Jr, 2004). If parties cannot target a specific voter type, *issue convergence* is impossible because the message that increases the winning probability of one party decreases that of another party.

3.2.4 Timing of the game

The timing of the game can be summarized as follows.

- Stage 1: Each political party announces its tax policy $t_L \in \{\underline{t}_L, \bar{t}_L\}$ and $t_R \in \{\underline{t}_R, \bar{t}_R\}$.
- Stage 2: Each political party chooses message $m_P \in \{-1, 1\}$.
- Stage 3: Each political party chooses campaign spending $C_P = (C^+_{l,P}, C^-_{l,P}, C^+_{h,P}, C^-_{h,P})$ within a budget constraint $\Sigma_i \Sigma_j C^j_{i,P} \leq 1$.
- Stage 4: Voters' salience weights are affected by the political campaign. Based on the posterior salience weights $s^j_i(m, C)$, voters make their voting decisions.

3.3 Analysis

In this section, we examine the equilibrium of the game. The equilibrium concept we use here is subgame perfect Nash equilibrium. We solve the game by backward induction, beginning with Stage 4: voting behavior.

3.3.1 Voting behavior

In the following section, we examine the voting behavior of v_l^+ and how the vote share from v_l^+ is determined. The vote share in other voter groups can be calculated by using the same method (please refer to Appendix D), and we derive the total vote share of each party.

We apply the probabilistic voting model (Lindbeck and Weibull, 1987; Persson and Tabellini, 2002) in voting behavior. Let us suppose that L proposes t_L and R proposes t_R. Then, voter k in group v_l^+ votes for L if

$$\begin{aligned} s_l^+(m,C)[(1-t_L)\omega_l + t_L\omega^*] - [1-s_l^+(m,C)](\rho_L-\rho^+)^2 \\ > s_l^+(m,C)[(1-t_R)\omega_l + t_R\omega^*] - [1-s_l^+(m,C)](\rho_R-\rho^+)^2 + \eta_{l,k}^+, \end{aligned} \tag{3.5}$$

where $\eta_{i,k}^j$ is an idiosyncratic affinity of voter k in group v_i^j toward party R. We suppose that $\eta_{i,k}^j$ is independently distributed across groups, and uniformly distributed on $[\eta - \frac{1}{2\phi}, \eta + \frac{1}{2\phi}]$. $\eta_{i,k}^j$ represents a voter's unobserved affinity toward R that is irrelevant to policy proposals. Additionally, we assume that voters' idiosyncratic affinities are affected by aggregate uncertainty η. We suppose that η is uniformly distributed on $[-\frac{1}{2\psi}, \frac{1}{2\psi}]$ that is realized after Stage 3 and before Stage 4. Therefore, the distribution of $\eta_{i,k}^j$ is not known with certainty at the time parties adopt their platforms/political campaigns. One interpretation of aggregate uncertainty is that parties are uncertain about what type of event will happen after policy announcements/political campaigns and before voting. Examples are sudden changes in the economic state and political scandals, which may happen during elections and affect voters' affinities for political parties in the same direction.

Let us note that by assumption, $\rho_L = \rho^-$ and $\rho_R = \rho^+$. Then, we have

$$s_l^+(m,C)[\mu_h\Delta\omega(t_L-t_R)] - [1-s_l^+(m,C)]\Delta\rho^2 > \eta_{l,k}^+, \tag{3.6}$$

where $\Delta\rho = \rho^+ - \rho^-$ and $\Delta\omega = \omega_h - \omega_l$.[44] $\Delta\rho$ represents the distance of social ideology, and $\Delta\omega = \omega_h - \omega_l$ represents the difference in income level. Intuitively, when $\Delta\rho$ is large, voters base their voting decisions more on social issues. In this case, choosing a party with the opposite

[44]Note that $\mu_h\Delta\omega(t_L - t_R)$ is derived from the fact that $\omega^* - \omega_l = \mu_h(\omega_h - \omega_l)$.

ideology results in greater voter losses. On the other hand, when $\Delta\omega$ is large, voters base their voting decisions more on economic issues. In this case, high-income voters stand to lose more, while low-income voters stand to gain more.

Since $\eta^+_{l,k}$ is uniformly distributed on $[\eta - \frac{1}{2\phi}, \eta + \frac{1}{2\phi}]$, the vote share of L in v^+_l can be calculated as[45]

$$\phi\{s^+_l(m,C)[\mu_h\Delta\omega(t_L - t_R)] - [1 - s^+_l(m,C)]\Delta\rho^2 + \frac{1}{2\phi} - \eta\}. \tag{3.7}$$

The logic being the same for v^-_l, v^+_h, v^-_h, intermediate developments are in Appendix D. We can calculate the total vote share of L as follows.

$$\begin{aligned}
V_L = & \underbrace{\mu^+_l\phi\{s^+_l(m,C)[\mu_h\Delta\omega(t_L - t_R)] - [1 - s^+_l(m,C)]\Delta\rho^2 + \frac{1}{2\phi} - \eta\}}_{\text{low-income/conservative}} \\
& + \underbrace{\mu^-_l\phi\{s^-_l(m,C)[\mu_h\Delta\omega(t_L - t_R)] + [1 - s^-_l(m,C)]\Delta\rho^2 + \frac{1}{2\phi} - \eta\}}_{\text{low-income/liberal}} \\
& + \underbrace{\mu^+_h\phi\{-s^+_h(m,C)[\mu_l\Delta\omega(t_L - t_R)] - [1 - s^+_h(m,C)]\Delta\rho^2 + \frac{1}{2\phi} - \eta\}}_{\text{high-income/conservative}} \\
& + \underbrace{\mu^-_h\phi\{-s^-_h(m,C)[\mu_l\Delta\omega(t_L - t_R)] + [1 - s^-_h(m,C)]\Delta\rho^2 + \frac{1}{2\phi} - \eta\}}_{\text{high-income/liberal}}.
\end{aligned} \tag{3.8}$$

L wins the race if $V_L > 1/2$. Then, the winning probability can be written as

$$\begin{aligned}
& Pr\{V_L > \frac{1}{2}\} \\
& \Leftrightarrow Pr\Big\{\mu^+_l\{s^+_l(m,C)[\mu_h\Delta\omega(t_L - t_R)] - [1 - s^+_l(m,C)]\Delta\rho^2\} \\
& + \mu^-_l\{s^-_l(m,C)[\mu_h\Delta\omega(t_L - t_R)] + [1 - s^-_l(m,C)]\Delta\rho^2\} \\
& + \mu^+_h\{-s^+_h(m,C)[\mu_l\Delta\omega(t_L - t_R)] - [1 - s^+_h(m,C)]\Delta\rho^2\} \\
& + \mu^-_h\{-s^-_h(m,C)[\mu_l\Delta\omega(t_L - t_R)] + [1 - s^-_h(m,C)]\Delta\rho^2\} > \eta\Big\}.
\end{aligned} \tag{3.9}$$

Since η is uniformly distributed on $[-\frac{1}{2\psi}, \frac{1}{2\psi}]$, the winning probability of L can be calculated

[45] We assume that ϕ is sufficiently small so that $s^+_l(m,C)[\mu_h\Delta\omega(t_L - t_R)] - [1 - s^+_l(m,C)]\Delta\rho^2$ falls in the range of $[\eta - \frac{1}{2\phi}, \eta + \frac{1}{2\phi}]$.

as[46]

$$
\begin{aligned}
W_L =&\mu_l^+\psi\{s_l^+(m,C)[\mu_h\Delta\omega(t_L-t_R)]-[1-s_l^+(m,C)]\Delta\rho^2\}\\
&+\mu_l^-\psi\{s_l^-(m,C)[\mu_h\Delta\omega(t_L-t_R)]+[1-s_l^-(m,C)]\Delta\rho^2\}\\
&+\mu_h^+\psi\{-s_h^+(m,C)[\mu_l\Delta\omega(t_L-t_R)]-[1-s_h^+(m,C)]\Delta\rho^2\}\\
&+\mu_h^-\psi\{-s_h^-(m,C)[\mu_l\Delta\omega(t_L-t_R)]+[1-s_h^-(m,C)]\Delta\rho^2\}+\frac{1}{2}. \qquad (3.10)
\end{aligned}
$$

The winning probability of R can be computed by using the same method.

$$
\begin{aligned}
W_R =&\mu_l^+\psi\{-s_l^+(m,C)[\mu_h\Delta\omega(t_L-t_R)]+[1-s_l^+(m,C)]\Delta\rho^2\}\\
&+\mu_l^-\psi\{-s_l^-(m,C)[\mu_h\Delta\omega(t_L-t_R)]-[1-s_l^-(m,C)]\Delta\rho^2\}\\
&+\mu_h^+\psi\{s_h^+(m,C)[\mu_l\Delta\omega(t_L-t_R)]+[1-s_h^+(m,C)]\Delta\rho^2\}\\
&+\mu_h^-\psi\{s_h^-(m,C)[\mu_l\Delta\omega(t_L-t_R)]-[1-s_h^-(m,C)]\Delta\rho^2\}+\frac{1}{2}. \qquad (3.11)
\end{aligned}
$$

Therefore, in the probabilistic voting model, both parties aim to maximize the weighted average payoff for each voter type. This suggests that political parties prioritize the demands of low-income voters over those of high-income voters due to the difference in their numbers ($\mu_l > \mu_h$). However, in the main result of this study (Proposition 3.2), we explore the possibility that both parties decrease tax rates to cater to the demands of high-income voters. This may seem counter-intuitive, given our assumption of a larger number of low-income voters who favor a higher tax rate. The key mechanism here is that high-income voters exhibit greater responsiveness to marginal changes in tax policies than that of low-income voters. Intuitively, this difference stems from the fact that high-income voters lose more than low-income voters gain with respect to the marginal change in tax rate, as per the assumption that $\mu_l > \mu_h$. As a result, parties may consider catering to the economic demands of high-income voters rather than low-income voters due to their higher responsiveness to policy changes.[47] Conversely, the marginal payoff in changing social ideologies for each voter is the same across income groups.

[46] We assume that ψ is sufficiently small so that the left-hand side of the inequality falls in the range of $[-\frac{1}{2\psi}, \frac{1}{2\psi}]$.

[47] This setting is consistent with empirical findings that suggest public policies are more responsive to the economic demands of high-income voters (Gilens, 2012; Gilens and Page, 2014; Hacker and Pierson, 2010).

This implies that when social ideologies matter more in voting decisions, the difference in responsiveness between income groups shrinks. As a result, the difference in group size ($\mu_l > \mu_h$) becomes relevant to political parties, leading both parties to be more likely to focus on low-income voters. This mechanism is related to Fact 3.1, as we discuss below. Technical details regarding these points are discussed in Appendix D.

3.3.2 Issue selection

Next, we investigate the political parties' behavior in Stages 2 and 3: the issue selection stage. First, we define concepts for analyzing parties' issue selection: *core voters* and *swing voters*.

Core voters are a set of voters whose preferences align with one of the political parties' proposals in both dimensions. On the contrary, *swing voters* are sets of voters whose preferences do not align with the proposals of both parties in one of either dimension. For example, let us suppose that in Stage 1, $t_L > t_R$ holds. Then, v_l^- represents *core voters* for party L, and v_h^+ represents *core voters* for party R. Party L advocates the ideal social policy $\rho_L = \rho^-$ for the group v_l^-. Furthermore, since $t_L > t_R$ holds, party L consistently promotes the preferred tax policy for v_l^-. A similar logic applies to v_h^+, where party R presents the preferred proposal for the preference of group v_h^+. On the other hand, v_l^+ and v_h^- are categorized as *swing voters* when $t_L > t_R$ holds. For instance, v_l^+ prefers party R's proposal on social issues while leaning towards party L's proposal on economic issues. The opposite happens for v_h^-, as v_h^- prefers party L's proposal on social issues while leaning towards party R's proposal on economic issues. We note that which parties are categorized to *core voters* and *swing voters* depend on the tax policy proposal in Stage 1. If $t_L < t_R$ holds, v_l^+, v_h^- are categorized as *core voters*, while v_l^-, v_h^+ are categorized as *swing voters*.

A crucial point to note is that when political parties determine their message (m_L, m_R) and campaign spending (C_L, C_R), their focus is primarily on *swing voters*, rather than *core voters*. This emphasis arises because the marginal impact of change in salience weights is more pronounced among *swing voters* than *core voters*. In essence, *core voters* are less likely to alter their behavior even if their priorities shift, as one of the political parties consistently presents the preferred policy in both policy dimensions. In contrast, the behavior of *swing voters* changes significantly based on issue salience weights. Consequently, political parties strive to influence the salience weights of *swing voters* rather than *core voters* to maximize their winning probabilities.

However, when voters decide their ballot mostly based on social ideology alone, it is possible that parties attempt to manipulate the salience weights of *core voters* rather than those of *swing voters*. To exclude this extreme case, we make the following assumption.

Assumption 3.1. $\frac{2\mu_l\mu_h\Delta\omega|t_L-t_R|}{\mu_l-\mu_h} > \Delta\rho^2$ for any pairs of (t_L, t_R).

This assumption necessitates an upper limit for $\Delta\rho$. Intuitively, if this assumption is violated, voters predominantly base their ballot decisions on their preference for social ideology. In such a scenario, there is an opportunity for parties to try to attract attention from *core voters*. Assumption 3.1 is used to exclude the possibility of parties targeting *core voters*. We discuss how this assumption operates in Appendix D.[48]

Next, we define two parameters, $\overline{\Omega}$ and $\underline{\Omega}$.

$$\overline{\Omega}(t_L, t_R; \Delta\omega, \Delta\rho, \mu_l) = \frac{\mu_l\mu_h|t_L - t_R|\Delta\omega + \mu_l\Delta\rho^2}{\mu_l\mu_h|t_L - t_R|\Delta\omega + \mu_h\Delta\rho^2}. \tag{3.12}$$

$$\underline{\Omega}(t_L, t_R; \Delta\omega, \Delta\rho, \mu_l) = \frac{\mu_l\mu_h|t_L - t_R|\Delta\omega + \mu_h\Delta\rho^2}{\mu_l\mu_h|t_L - t_R|\Delta\omega + \mu_l\Delta\rho^2}. \tag{3.13}$$

As we see in Proposition 3.1, $\overline{\Omega}$ and $\underline{\Omega}$ are the cutoff points at which each party changes its message m_P and campaign spending $C^j_{i,P}$. The only difference between $\overline{\Omega}$ and $\underline{\Omega}$ is μ_h and μ_l in the second term of numerator and denominator. Since we assume that $\mu_l > \mu_h$, $\overline{\Omega} > 1 > \underline{\Omega}$ holds.[49] We can also check the condition that the distance between $\overline{\Omega}$ and $\underline{\Omega}$ widens/shrinks.

Fact 3.1. $\overline{\Omega} - \underline{\Omega}$ is an increasing function of $\Delta\rho$, μ_l, while decreasing function of $\Delta\omega$.

Proof. See Appendix C. □

While the distance between $\overline{\Omega}$ and $\underline{\Omega}$ depends on several parameters, our focus in the following discussion is on the role of $\Delta\rho$. The reason for this emphasis is that parameters related to income inequality (μ_l and $\Delta\omega$) have opposing effects, making their interpretation challenging. For instance, when the proportion of low-income voters increases (and that of high-income voters decreases), the gap between $\overline{\Omega}$ and $\underline{\Omega}$ widens. Conversely, when the income gap $\Delta\omega$ increases,

[48] If we do not use Assumption 3.1, the parameter discussed below varies depending on the parameters included in Assumption 3.1. This unnecessarily complicates the subsequent analysis.

[49] In the following discussion, we simplify the notation of $\overline{\Omega}(t_L, t_R; \Delta\omega, \Delta\rho, \mu_l)$ and $\underline{\Omega}(t_L, t_R; \Delta\omega, \Delta\rho, \mu_l)$ to just $\overline{\Omega}$ and $\underline{\Omega}$.

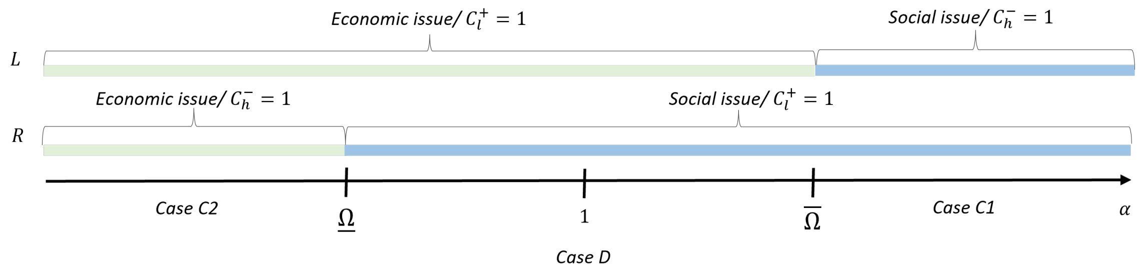


Figure 3.1: Equilibrium in Stages 2 and 3 ($t_L > t_R$)

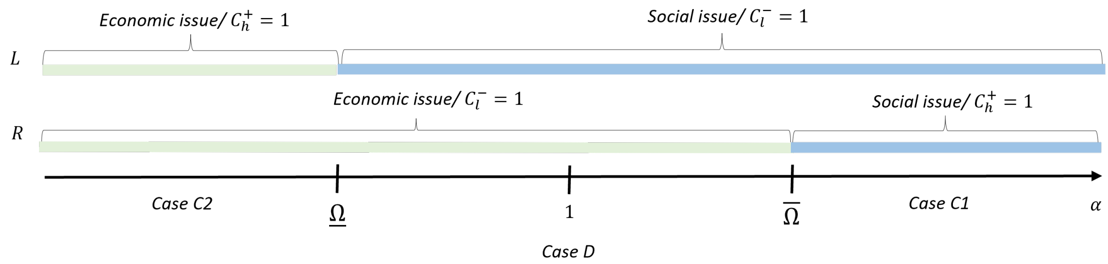


Figure 3.2: Equilibrium in Stages 2 and 3 ($t_L < t_R$)

the gap between $\overline{\Omega}$ and $\underline{\Omega}$ shrinks. Therefore, it is unclear how rising income inequality affects $\overline{\Omega} - \underline{\Omega}$.

Under those settings, we can derive the conditions in which each party chooses message m_P and campaign spending $C^j_{i,P}$.

Proposition 3.1. Suppose that each party proposes (t_L, t_R) in Stage 1. Then, equilibrium in Stages 2 and 3 is determined as follows.

(i) $t_L > t_R$

Case C1: If $\alpha > \overline{\Omega}$, $m_L = m_R = -1$ and $C^-_{h,L} = C^+_{l,R} = 1$.

Case D: If $\overline{\Omega} > \alpha > \underline{\Omega}$, $m_L = 1, m_R = -1$ and $C^+_{l,L} = C^+_{l,R} = 1$.

Case C2: If $\underline{\Omega} > \alpha$, $m_L = m_R = 1$ and $C^+_{l,L} = C^-_{h,R} = 1$.

(ii) $t_L < t_R$

Case C1: If $\alpha > \overline{\Omega}$, $m_L = m_R = -1$ and $C^-_{l,L} = C^+_{h,R} = 1$.

Case D: If $\overline{\Omega} > \alpha > \underline{\Omega}$, $m_L = -1, m_R = 1$ and $C^-_{l,L} = C^-_{l,R} = 1$.

Case C2: If $\underline{\Omega} > \alpha$, $m_L = m_R = 1$ and $C^+_{h,L} = C^-_{l,R} = 1$.

Proof. See Appendix C. □

In the proposition, *Case C* signifies the *convergence* of the message, and *Case D* represents the *divergence* of the message. First, in this proposition, both parties focus only on *swing voters*, i.e., v_l^+, v_h^- when $t_L > t_R$ and v_l^-, v_h^+ when $t_L < t_R$. This is because the marginal effect of message/campaign spending is more pronounced in *swing voters* than in *core voters*. Figures 3.1 and 3.2 summarize the conditions of Proposition 1. As those figures show, the proposed tax rate in Stage 1 alters the swing voter types and also changes the cutoff point for each party: $\overline{\Omega}$ for L and $\underline{\Omega}$ for R when $t_L > t_R$, while $\underline{\Omega}$ for L and $\overline{\Omega}$ for R when $t_L < t_R$. Except for this point, however, the mechanism is the same.

Since we prove that $t_L > t_R$ must hold in equilibrium in the following section, let us focus on the explanation of the case (i) $t_L > t_R$. The proposition states that if the issue bias α is sufficiently large, both parties convey the message that "social issues are of great importance" (*Case C1*) to the different swing voters (high-income/low-income). Conversely, if the issue bias α is small enough, both parties communicate that "economic issues are of significant importance" (*Case C2*) to the different swing voters. In other words, in each case, *issue convergence* occurs. One interpretation of α is the media emphasis on a social issue during an electoral campaign. Then, the intuition is that if voters are more likely to shift their interest towards a social issue due to the media emphasis, parties attempt to direct voter attention towards social issues (*Case C1*) because they can manipulate voters' attention toward social issues more cost-efficiently. The opposite happens in *Case C2*.

Moreover, Proposition 3.1 states that if α falls within the range of $\overline{\Omega}$ and $\underline{\Omega}$, *issue divergence* occurs: In this equilibrium, both parties target low-income/conservative voters, directing party L to emphasize economic issues, while party R emphasizes social issues. This is because there are more low-income voters than high-income voters due to inequality (i.e., $\mu_l > \mu_h$), making the campaign effect on low-income swing voters (v_l^+) more pronounced than that on high-income swing voters (v_h^-), given that the effect of α is relatively neutral. Therefore, party L emphasizes economic issues to attract v_l^+, as v_l^+ prefers L's tax rate proposal, while party R emphasizes social issues to attract v_l^+ since v_l^+ prefers R's social ideological position.

As $\Delta\rho$ increases, the distance between $\overline{\Omega}$ and $\underline{\Omega}$ widens (Fact 3.1). Therefore, if social ideologies become more polarized, *Case D* is more likely to occur. The intuition is as follows: As discussed in Section 3.3.1 and Appendix D, high-income voters are more responsive to tax rates than low-income voters, which raises the possibility that parties may attempt to manipulate the salience weight of high-income voters despite differences in group size ($\mu_l > \mu_h$). However, as social ideologies become more influential with increasing $\Delta\rho$, the difference in responsiveness among income levels shrinks. In other words, as $\Delta\rho$ increases, *swing voters* base their ballot decisions more on social issues rather than economic issues, causing the difference in size between income groups to become more pronounced. This shift compels both parties to focus more on low-income swing voters due to their group size, making *Case D* more likely to occur.

As a side note, in the current setting, $\Delta\rho$ has an upper limit imposed by Assumption 3.1. Therefore, it is impossible for *Case D* to occur for any value of α. In other words, *issue convergence* can occur, especially when α strongly leans in either direction.

3.3.3 Policy proposals

In this subsection, we analyze how parties issue selection strategy and change in voters' salience weights affects tax policy proposals. To this end, we first introduce the benchmark case: Voters' salience weights are common and fixed.

Fact 3.2. Let us suppose that the salience weights of each type of voter are common and fixed. Then, tax rate proposals do not affect the winning probability, i.e., $\frac{\partial W_L}{\partial t_L} = \frac{\partial W_R}{\partial t_R} = 0$.

Proof. Let us denote the salience weight of each voter as $s > 0$. By differentiating each party's winning probability with respect to t_L and t_R, we have

$$\frac{\partial W_L}{\partial t_L} = s\psi\mu_l^+\mu_h\Delta\omega + s\psi\mu_l^-\mu_h\Delta\omega - s\psi\mu_h^+\mu_l\Delta\omega - s\psi\mu_h^-\mu_l\Delta\omega = 0. \tag{3.14}$$

$$\frac{\partial W_R}{\partial t_R} = s\psi\mu_l^+\mu_h\Delta\omega + s\psi\mu_l^-\mu_h\Delta\omega - s\psi\mu_h^+\mu_l\Delta\omega - s\psi\mu_h^-\mu_l\Delta\omega = 0. \tag{3.15}$$

□

In other words, political parties are indifferent to any tax proposals as far as voters have common and fixed salience weights. It may seem counter-intuitive because there are more low-income voters, and political parties tend to cater to the economic demands of low-income voters when all voters share the same salience weights. The reason is that the voters' marginal payoff of the tax rate for high-income voters is more significant than that for low-income voters, which dissipates the effect of the size difference ($\mu_l > \mu_h$). This is a mechanism explained in Section

3.3.1 and Appendix D.[50]

Departing from the above benchmark case, we demonstrate that when salience weights diverge among voters due to the political campaign, this divergence incentivizes political parties to change tax policies in a specific direction. Firstly, we explore the equilibrium where each party emphasizes a different issue, i.e., *Case D*. We prove the following lemma.[51]

Lemma 3.1. Let us suppose that *Case D* holds for any pairs of (t_L, t_R).
(i) If $\alpha > 1$, then $W_L(\underline{t}_L, \bar{t}_R) > W_L(\bar{t}_L, \bar{t}_R)$ and $W_R(\underline{t}_L, \bar{t}_R) < W_R(\underline{t}_L, \underline{t}_R)$.
(ii) If $\alpha < 1$, then $W_L(\underline{t}_L, \bar{t}_R) < W_L(\bar{t}_L, \bar{t}_R)$ and $W_R(\underline{t}_L, \bar{t}_R) > W_R(\underline{t}_L, \underline{t}_R)$.

Proof. See Appendix C. □

We note that this lemma guarantees that $t_L > t_R$ must hold in equilibrium: In this simplified framework, the only possibility that $t_L < t_R$ holds is $t_L = \underline{t}_L$ and $t_R = \bar{t}_R$. However, by Lemma 3.1, at least one party always has the incentive to deviate from $(\underline{t}_L, \bar{t}_R)$. This means that $t_L > t_R$ always holds in *Case D*, and both parties attempt to manipulate the issue salience weights of low-income/conservative voters.

Using this lemma, the main result of this study can be stated as follows.

Proposition 3.2. Suppose that *Case D* holds for any pairs of (t_L, t_R).
(i) If $\alpha > 1$, $t_L = \underline{t}_L$ and $t_R = \underline{t}_R$.
(ii) If $\alpha < 1$, $t_L = \bar{t}_L$ and $t_R = \bar{t}_R$.

Proof. See Appendix C. □

The intuition is as follows: In *Case D*, party L emphasizes the economic issue, while party R emphasizes the social issue to attract attention from low-income/conservative voters. If $\alpha > 1$, the impact of party R's campaign outweighs that of party L through the amplifying effect of *issue bias*. Consequently, low-income swing voters' attention is more likely to shift toward the social issue. The crucial point is that the change in salience weight toward social issues

[50] Even if we change the assumption $\mu^+ = \mu^-$, the result remains the same. However, if we assume a correlation between income level and social ideologies, the result is different. However, we do not investigate this possibility because changing the assumption unnecessarily complicates the following discussion. Additionally, the independent assumption aligns with reality, as explained in Section 3.2.2.

[51] In the following analysis, we focus on the scenario where each case (*Case D*, *Case C1*, and *Case C2*) continues to hold for any pairs of (t_L, t_R) to ensure the tractability of the analysis. This is equivalent to assuming that the distance between t_L and t_R is not significantly different, and that $\overline{\Omega}$ and $\underline{\Omega}$ do not change significantly depending on the pairs of tax policies.

intensifies more among low-income/conservative voters than that among other voter segments. This is because both parties devote campaign spending to low-income/conservative voters. This implies that, in equilibrium, low-income voters, in total, pay more attention to social issues than do high-income voters. Stated differently, high-income voters retain a relatively higher salience weight in economic issues than low-income voters. As a result, political parties adjust their tax rates to cater to the preferences of high-income voters, who have a relatively higher focus on economic policy. This mechanism has a structure similar to the often-held view stated in the introduction: The right-wing party's strategy to increase the salience of religious issues diverts the attention of low-income voters away from economic concerns and towards religious issues, potentially pushing economic policy to the right.

The opposite mechanism happens when $\alpha < 1$. In the above case, both parties attempt to capture the attention of low-income/conservative voters, while in the current case, their attention is more likely to shift towards an economic issue. Therefore, in this equilibrium, political parties adjust their tax rates to cater to the economic preferences of low-income voters, who have relatively higher attention toward an economic policy.

In summary, in *Case D*, tax proposals depend on whether the campaign effect of R (emphasizing a social issue) outweighs that of L (emphasizing an economic issue). In this model, the effect is amplified by the *issue bias* α. If the campaign effect of R outweighs that of L, both parties have an incentive to lower the tax rate because low-income voters shift their attention from the economic issue to the social issue more than high-income voters do. The opposite happens when $\alpha < 1$.

As we explain in Fact 3.1 and Proposition 3.1, if the social ideological stance becomes polarized (i.e., $\Delta\rho$ becomes large), *Case D* is more likely to occur. However, if the issue bias α is large or small enough, there is a possibility that *issue convergence* happens. To complement the main result, we demonstrate how the tax rate is determined under the cases *Case C1* and *Case C2*.

First, we provide the following lemma.

Lemma 3.2. There are two cases.
(i) If *Case 1* holds for any pairs of (t_L, t_R), $W_L(\underline{t}_L, \bar{t}_R) > W_L(\bar{t}_L, \bar{t}_R)$ and $W_R(\underline{t}_L, \bar{t}_R) < W_R(\underline{t}_L, \underline{t}_R)$.
(ii) If *Case 2* holds for any pairs of (t_L, t_R), $W_L(\underline{t}_L, \bar{t}_R) < W_L(\bar{t}_L, \bar{t}_R)$ and $W_R(\underline{t}_L, \bar{t}_R) >$

$W_R(\underline{t}_L, \underline{t}_R)$.

Proof. See Appendix C. $\square$

This lemma has a similar structure to Lemma 3.1, and it guarantees that $\underline{t}_L < \bar{t}_R$ does not hold in an equilibrium. This can be checked because in each case, one party has an incentive to deviate from $(\underline{t}_L, \bar{t}_R)$. By using this lemma, we can obtain the following proposition.

Proposition 3.3. In equilibrium, the tax rate is determined as follows.
(i) If *Case C1* holds for any pairs of (t_L, t_R), the equilibrium must be $(\bar{t}_L, \underline{t}_R)$ or $(\underline{t}_L, \underline{t}_R)$.
(ii) If *Case C2* holds for any pairs of (t_L, t_R), the equilibrium must be $(\bar{t}_L, \underline{t}_R)$ or $(\bar{t}_L, \bar{t}_R)$.

Proof. See Appendix C. $\square$

The important implication of Proposition 3.3 is that, unlike *Case D*, when *issue convergence* happens, *issue bias* α does not necessarily lead both parties' tax policy proposals in the same direction. For example, in *Case C1*, even though α is large and both parties emphasize the social issue, party L can choose either higher tax rates $\bar{t}_L$ or lower tax rate $\underline{t}_L$. The *issue bias* matters and changes both parties' tax policy in the same direction only when *Case D* holds.

However, why are tax rates determined as Proposition 3.3 states in *issue convergence* case? Understanding the mechanism is slightly harder than the *issue divergence* case. Firstly, we can check that the change in salience weights in *Case C1* and *Case C2* does not affect the marginal effect of the tax policy proposals on winning probability; that is, the marginal effect of tax policy on winning probability remains 0 as in benchmark case, even after being influenced by the political campaign.[52] The reason is as follows: In *Case C1* and *Case C2*, both parties are motivated to emphasize the same issue (say economic issue) to different voter groups—one consisting of low-income swing voters and the other consisting of high-income swing voters. Consequently, the effects of changes in salience weights on tax policy proposals cancel each other out because both *swing voters*' salience weights change to the same extent. This result distinguishes it from *Case D*, where both parties emphasize different issues, leading to one party's campaign effect outweighing the other due to the *issue bias* α.

Secondly, even though tax rate proposals do not directly change the winning probability of each party, they indirectly affect the winning probability through the shift of swing voter types.

[52] Refer to the proof of Proposition 3.3 and equations (3.77) and (3.78) to verify this argument.

More specifically, in *Case C1*, party R has an incentive to choose $\underline{t}_R$, while in *Case C2*, party L has an incentive to choose $\bar{t}_L$ to keep swing voter types as they want. Let us consider that (i) *Case 1* holds for any pairs of (t_L, t_R). This implies that α is large, and both parties have an incentive to emphasize a social issue. Then, if $t_L > t_R$ holds, party R attempts to attract low-income swing voters, i.e., low-income/conservative voters. However, if $t_L < t_R$, party R directs its campaign toward high-income swing voters, i.e., high-income/conservative voters. Given that the change in salience weights among low-income voters has a greater impact on winning probability than that among high-income voters due to its difference in size ($\mu_l > \mu_h$), party R prefers to alter the salience among low-income voters.[53] As a result, it chooses t_R such that $t_L > t_R$ to make v_l^+ as *swing voters*, even though the change in the tax rate does not directly impact the winning probability. A similar mechanism applies to *Case 2*, where party L has the incentive to choose t_L so that $t_L > t_R$.

3.4 Discussions

In this section, we briefly discuss the implications of our main results—Propositions 3.1 and 3.2—along with related empirical findings, and we also compare the model structure with related literature.

Discussion on Proposition 3.1

Proposition 3.1 argues that polarization of social ideologies motivates both parties to focus on low-income/conservative voters. This leads the liberal party to emphasize economic issues, while the conservative party emphasizes social issues.

There are several debates about whether ideologies have become polarized among political elites and voters. Scholars seem to agree that political elites have become more ideologically polarized on a broad set of issues, including social issues over the decades (McCarty et al., 2016). On the other hand, there are controversies about whether voters become polarized. For example, DiMaggio et al. (1996), Evans (2003), Fiorina and Abrams (2008), Fiorina et al. (2011), Hill and Tausanovitch (2015) show that there is little evidence that voters have become more polarized on social issues than before, while Abramowitz and Saunders (2008) and Abramowitz (2010) indicate that ideological polarization has increased among the public as well as among political

[53] Refer to the proof of Lemma 3.2 to verify this argument.

elites.

On the other hand, several evidence seem to support the strategies of each party in *Case D*: the conservative party emphasizes social issues, while the liberal party focuses on economic redistribution. For instance, it is widely held that Ronald Reagan began introducing controversial social topics—particularly religious issues—into the political arena and integrated evangelicals into the mainstream. Coe and Domke (2006) and Domke and Coe (2008) substantiate this perspective. They conducted an analysis of presidents' inaugural and state of the union addresses, demonstrating that Ronald Reagan's presidency marked a turning point in the discussion of religious matters in American presidential politics. Furthermore, as previously noted, during the 2004 U.S. presidential election, George W. Bush placed significant emphasis on religious issues and advocated conservative religious policies, such as opposition to abortion and same-sex marriage. Moreover, as pointed out by several researchers, the Democratic party tends to emphasize social welfare issues in a presidential campaign (Petrocik et al., 2003; Rhodes and Johnson, 2017).

As a note, in the above-mentioned example, the Republican strategy to attract religious voters includes not only emphasizing the importance of the issue but also incorporating the strategy of repositioning their stance toward a more extreme right, such as strong opposition to same-sex marriage and abortion. However, since parties exogenously commit to the social position in our model, we do not address how their issue selection strategy interacts with their repositioning in the social ideological dimension. Nevertheless, it is possible that changing policy stance toward an extreme position may interact with increasing issue salience, which could be an interesting topic for future research.

Discussion on Proposition 3.2

In a scenario where social ideologies become polarized, Proposition 3.2 predicts that if *issue bias* leans toward a social issue, such as abortion and same-sex marriage, both parties are inclined to advocate for lower tax rates, exacerbating income inequality further. Conversely, if *issue bias* leans toward an economic issue, the opposite occurs. The mechanism behind this result is as follows: in this equilibrium, both parties attempt to manipulate the salience weights of low-income swing voters. If their attention shifts toward social issues due to the *issue bias*, such as media-induced bias, political parties are more likely to choose a lower tax rate, aligning with the demands of high-income voters who continue to have relatively high salience weights toward economic issues.

There is some evidence that the salience of social issues has been increasing due to the media effect, which aligns with Proposition 3.2 (i). For instance, by using data from the American National Election Studies, Houtman et al. (2009) examined how the salience of issues in presidential elections changed from 1960 to 2000. They found that the percentage of voters who prioritized cultural or moral issues as the most important has significantly increased, while the percentage of voters who considered issues related to class inequality or economic distribution as the most important has remained stable. Houtman et al. (2009) argued that this trend aligns with the findings of Layman (2001), which indicate that U.S. newspapers have increasingly focused on cultural issues during the period of 1977-1996. This may indicate that *issue bias* α is larger than 1, which leads voters' salience weights toward social issues.

Additionally, it is a widely held view that in the U.S., the federal government has been reluctant to address escalating income inequality for decades, irrespective of party affiliation (Franko and Witko, 2018). For instance, studies by Gilens (2012), Gilens and Page (2014), and Hacker and Pierson (2010) demonstrate that public policies tend to be more responsive to the economic demands of high-income voters, even in the context of increasing inequality.

Our theoretical result suggests a connection between these two phenomena: causality from the increase in the salience of social issues to income inequality. However, to confirm this relationship, more rigorous empirical research appears to be necessary.

Comparison with related literature

Finally, we briefly discuss the comparison between our model and Krasa and Polborn (2014), which both deal with a similar model—political competition between liberal and conservative parties with fixed ideological positions and competing for tax policy proposals.

As explained in the introduction, the most distinctive feature of our model, in comparison to Krasa and Polborn (2014), is its focus on the interaction between tax policy proposals and issue selection strategy. Our model demonstrates that the divergence in salience weights due to the political campaign motivates both parties to modify their tax policies, which contrasts with Krasa and Polborn (2014), which assumes that voters have the same fixed issue salience weights.

Krasa and Polborn (2014) investigate the change in tax rate proposals from a different perspective. They demonstrate that changes in parties' cultural (social) positions affect tax policy proposals, which leads to different conclusions from our model. Unlike our model, Krasa and Polborn (2014) assume that voters' characteristics (both income and ideological position) are continuously distributed, implying a continuum of swing voters with varying social and economic preferences. In Krasa and Polborn (2014), political parties adjust their tax rates to cater to the weighted average of swing voters' preferences. Then, changes in the cultural policy proposals of political parties influence the income types of the average swing voters, leading to alterations in tax rate proposals. For instance, if the average swing voter type is conservative, and the gap between the social ideological positions of the parties widens, the average swing voter becomes more economically liberal, prompting both parties to increase the tax rate. Such interactions do not occur in our model.

3.5 Conclusion

In this study, we investigate the circumstances under which political parties attempt to attract voters' attention to a specific issue and how such a strategy relates to parties' tax policies. We then demonstrate that as the social ideology becomes polarized, both parties attempt to divert attention from low-income/conservative voters. This phenomenon leads liberal parties to emphasize economic issues, while conservative parties emphasize social issues, aligning with the preferences of low-income/conservative voters. Consequently, in this equilibrium, if there is an *issue bias* towards social issues, both parties attempt to lower the tax rate, resulting in worsened income inequality. This occurs because parties' issue selection strategies divert the attention of low-income/conservative voters away from economic issues (such as the tax rate), and both parties adjust their proposed tax rates to cater to the demands of high-income voters.

There are some limitations to the current study. First, in the current study we assume that political parties have restrictions on changing their policy platforms due to their history or party label. However, there may be endogenous reasons for this restriction. For example, Roemer (1998, 2001) and Anesi and Donder (2009) propose a model in which parties propose platforms that are Pareto efficient only for the factions that compose the party. Extending the model to include endogenous mechanisms that explain why parties cannot change their platform may be an interesting topic for future research.

Additionally, revealing the role of media outlets in the current model may be another interesting topic. In Proposition 3.2, we argued that *issue bias* α plays a crucial role in deciding the direction of the tax rate. However, we do not explicitly consider the behavior of media outlets and assume that this parameter is exogenously determined. Although we omit media outlet behavior in this model, there is ample evidence that issue salience is affected through the interaction of media reporting and political candidates' messages/campaigns (Dalton et al., 1998). Therefore, considering the role of media outlets in the current setting is a promising avenue for future research.

Appendix C

C.1. Proof of Fact 3.1

First, we check that $\partial\overline{\Omega}/\partial\Delta\rho^2 > 0$. Let us denote the numerator of $\overline{\Omega}$ as N and the denominator of $\overline{\Omega}$ as D. By differentiating $\overline{\Omega}$ with respect to $\Delta\rho^2$, we have

$$\begin{aligned} \frac{\partial\overline{\Omega}}{\partial\Delta\rho^2} &= \frac{\mu_l D - \mu_h N}{D^2} > 0 \\ &\Leftrightarrow \frac{(\mu_l - \mu_h)\mu_l\mu_h|t_L - t_R|\Delta\omega}{D^2} > 0. \end{aligned} \tag{3.16}$$

Next, we check that $\partial\overline{\Omega}/\partial\mu_l > 0$. By differentiating $\overline{\Omega}$ with respect to μ_l, we have

$$\frac{\partial\overline{\Omega}}{\partial\mu_l} = \frac{(1-2\mu_l))|t_L - t_R|\Delta\omega(D-N) + \Delta\rho^2(D+N)}{D^2} > 0. \tag{3.17}$$

Since $\mu_l > 1/2$ and $D < N$, this inequality must hold.

Finally, we check that $\frac{\partial\overline{\Omega}}{\partial\Delta\omega} < 0$.

$$\begin{aligned} \frac{\partial\overline{\Omega}}{\partial\Delta\omega} &= \frac{\mu_l\mu_h|t_L - t_R|D - \mu_l\mu_h|t_L - t_R|N}{D^2} < 0 \\ &\Leftrightarrow \frac{(\mu_h - \mu_l)\mu_l\mu_h|t_L - t_R|\Delta\rho^2}{D^2} < 0. \end{aligned} \tag{3.18}$$

Since $\underline{\Omega}$ is an inverse of $\overline{\Omega}$, $\frac{\partial\underline{\Omega}}{\partial\Delta\rho^2} < 0$, $\frac{\partial\underline{\Omega}}{\partial\mu_l} < 0$, and $\frac{\partial\underline{\Omega}}{\partial\Delta\omega} > 0$ hold. Then, we derive the result. □

C.2. Proof of Proposition 3.1

(i) $t_L > t_R$

In the following, we consider the case of party L. First, we consider Stage 3: campaign spending. There are two cases.

(a) $m_L = 1$

By differentiating winning probability function W_L with respect to $C^j_{i,L}$, we have

$$\frac{\partial W_L}{\partial C^+_{l,L}} = \beta\psi\mu^+_l[\mu_h(t_L - t_R)\Delta\omega + \Delta\rho^2]. \tag{3.19}$$
$$\frac{\partial W_L}{\partial C^-_{l,L}} = \beta\psi\mu^-_l[\mu_h(t_L - t_R)\Delta\omega - \Delta\rho^2]. \tag{3.20}$$
$$\frac{\partial W_L}{\partial C^+_{h,L}} = \beta\psi\mu^+_h[-\mu_l(t_L - t_R)\Delta\omega + \Delta\rho^2]. \tag{3.21}$$
$$\frac{\partial W_L}{\partial C^-_{h,L}} = \beta\psi\mu^-_h[-\mu_l(t_L - t_R)\Delta\omega - \Delta\rho^2]. \tag{3.22}$$

Since $\frac{\partial W_L}{\partial C^-_{h,L}} < 0$, $C^-_{h,L}$ must be 0. Since $\mu^+_l > \mu^+_h$, we have $\frac{\partial W_L}{\partial C^+_{l,L}} > \frac{\partial W_L}{\partial C^+_{h,L}}$. Also, since $\mu^+_l = \mu^-_l$, we have $\frac{\partial W_L}{\partial C^+_{l,L}} > \frac{\partial W_L}{\partial C^-_{l,L}}$. Therefore, in equilibrium, $C^+_{l,L} = 1$ must hold.

(b) $m_L = -1$

By differentiating winning probability function W_L with respect to $C^j_{i,L}$, we have

$$\frac{\partial W_L}{\partial C^+_{l,L}} = \alpha\beta\psi\mu^+_l[-\mu_h(t_L - t_R)\Delta\omega - \Delta\rho^2]. \tag{3.23}$$
$$\frac{\partial W_L}{\partial C^-_{l,L}} = \alpha\beta\psi\mu^-_l[-\mu_h(t_L - t_R)\Delta\omega + \Delta\rho^2]. \tag{3.24}$$
$$\frac{\partial W_L}{\partial C^+_{h,L}} = \alpha\beta\psi\mu^+_h[\mu_l(t_L - t_R)\Delta\omega - \Delta\rho^2]. \tag{3.25}$$
$$\frac{\partial W_L}{\partial C^-_{h,L}} = \alpha\beta\psi\mu^-_h[\mu_l(t_L - t_R)\Delta\omega + \Delta\rho^2]. \tag{3.26}$$

Since $\frac{\partial W_L}{\partial C^+_{l,L}} < 0$, $C^+_{l,L}$ must be 0. By Assumption 3.1, $\frac{\partial W_L}{\partial C^-_{h,L}} > \frac{\partial W_L}{\partial C^-_{l,L}}$ holds.[54] Also, since $\mu^+_h = \mu^-_h$, we have $\frac{\partial W_L}{\partial C^-_{h,L}} > \frac{\partial W_L}{\partial C^+_{h,L}}$. Therefore, in equilibrium, $C^-_{h,L} = 1$ must hold. Along the same logic, we can check that (a) if $m_R = 1$, $C^-_{h,R} = 1$ and (b) if $m_R = -1$, $C^+_{l,R} = 1$.

Next, we investigate how party L chooses the message, $m_L \in \{-1, 1\}$. Let us denote the partial derivative of W_L with respect to m_L in the positive direction as $\frac{\partial W_L}{\partial m_L}\Big|_{\oplus}$. Considering the fact that L chooses $C^+_{l,L} = 1$ when $m_L = 1$, we have

$$\begin{aligned}\frac{\partial W_L}{\partial m_L}\Big|_{\oplus} =& 2\beta\psi\mu^+_l[\mu_h(t_L - t_R)\Delta\omega + \Delta\rho^2] + \beta\psi\mu^-_l[\mu_h(t_L - t_R)\Delta\omega - \Delta\rho^2] \\ &+ \beta\psi\mu^+_h[-\mu_l(t_L - t_R)\Delta\omega + \Delta\rho^2] + \beta\psi\mu^-_h[-\mu_l(t_L - t_R)\Delta\omega - \Delta\rho^2] \\ &= \beta\psi\mu^+_l[\mu_h(t_L - t_R)\Delta\omega + \Delta\rho^2]. \end{aligned} \tag{3.27}$$

Along the same line, let us denote the partial derivative of W_L with respect to m_L in the negative direction as $\frac{\partial W_L}{\partial m_L}\Big|_{\ominus}$. Considering the fact that L chooses $C^-_h = 1$ if $m_L = -1$, we have

$$\begin{aligned}\frac{\partial W_L}{\partial m_L}\Big|_{\ominus} =& \alpha\beta\psi\mu^+_l[-\mu_h(t_L - t_R)\Delta\omega - \Delta\rho^2] + \alpha\beta\psi\mu^-_l[-\mu_h(t_L - t_R)\Delta\omega + \Delta\rho^2] \\ &+ \alpha\beta\psi\mu^+_h[\mu_l(t_L - t_R)\Delta\omega - \Delta\rho^2] + 2\alpha\beta\psi\mu^-_h[\mu_l(t_L - t_R)\Delta\omega + \Delta\rho^2] \\ &= \alpha\beta\psi\mu^-_h[\mu_l(t_L - t_R)\Delta\omega + \Delta\rho^2]. \end{aligned} \tag{3.28}$$

Then, L chooses $m_L = 1$ if

$$\begin{aligned}&\frac{\partial W_L}{\partial m_L}\Big|_{\oplus} > \frac{\partial W_L}{\partial m_L}\Big|_{\ominus} \\ &\Leftrightarrow \beta\psi\mu^+_l[\mu_h(t_L - t_R)\Delta\omega + \Delta\rho^2] > \alpha\beta\psi\mu^-_h[\mu_l(t_L - t_R)\Delta\omega + \Delta\rho^2] \\ &\Leftrightarrow \overline{\Omega} = \frac{\mu_l\mu_h(t_L - t_R)\Delta\omega + \mu_l\Delta\rho^2}{\mu_l\mu_h(t_L - t_R)\Delta\omega + \mu_h\Delta\rho^2} > \alpha. \end{aligned} \tag{3.29}$$

Otherwise, L chooses $m_L = -1$.

Along the same line, R chooses $m_R = 1$ if

[54] Please consult Appendix D for a detailed discussion on how Assumption 3.1 operates.

$$
\begin{aligned}
&\left.\frac{\partial W_R}{\partial m_R}\right|_{\oplus} > \left.\frac{\partial W_R}{\partial m_R}\right|_{\ominus} \\
&\Leftrightarrow \beta\psi\mu_h^-[\mu_l(t_L - t_R)\Delta\omega + \Delta\rho^2] > \alpha\beta\psi\mu_l^+[\mu_h(t_L - t_R)\Delta\omega + \Delta\rho^2] \\
&\Leftrightarrow \underline{\Omega} = \frac{\mu_l\mu_h(t_L - t_R)\Delta\omega + \mu_h\Delta\rho^2}{\mu_l\mu_h(t_L - t_R)\Delta\omega + \mu_l\Delta\rho^2} > \alpha. \qquad (3.30)
\end{aligned}
$$

Otherwise, R chooses $m_R = -1$.

(ii) $t_L < t_R$

The logic is the same as the case of (i) $t_L > t_R$. First, we consider the Stage 3.

(a) $m_L = 1$

By differentiating winning probability function W_L with respect to $C_{i,L}^j$, we have

$$\frac{\partial W_L}{\partial C_{l,L}^+} = \beta\psi\mu_l^+[-\mu_h(t_R - t_L)\Delta\omega + \Delta\rho^2]. \qquad (3.31)$$

$$\frac{\partial W_L}{\partial C_{l,L}^-} = \beta\psi\mu_l^-[-\mu_h(t_R - t_L)\Delta\omega - \Delta\rho^2]. \qquad (3.32)$$

$$\frac{\partial W_L}{\partial C_{h,L}^+} = \beta\psi\mu_h^+[\mu_l(t_R - t_L)\Delta\omega + \Delta\rho^2]. \qquad (3.33)$$

$$\frac{\partial W_L}{\partial C_{h,L}^-} = \beta\psi\mu_h^-[\mu_l(t_R - t_L)\Delta\omega - \Delta\rho^2]. \qquad (3.34)$$

The order of t_L and t_R are reversed. Since $\frac{\partial W_L}{\partial C_{l,L}^-} < 0$, $C_{l,L}^-$ must be 0. By Assumption 3.1, $\frac{\partial W_L}{\partial C_{h,L}^+} > \frac{\partial W_L}{\partial C_{l,L}^+}$. Also, since $\mu_h^+ = \mu_h^-$, we have $\frac{\partial W_L}{\partial C_{h,L}^+} > \frac{\partial W_L}{\partial C_{h,L}^-}$. Therefore, in equilibrium, $C_{h,L}^+ = 1$ must hold.

(b) $m_L = -1$

By differentiating winning probability function W_L with respect to $C_{i,L}^j$, we have

$$\frac{\partial W_L}{\partial C^+_{l,L}} = \alpha\beta\psi\mu^+_l[\mu_h(t_R - t_L)\Delta\omega - \Delta\rho^2]. \tag{3.35}$$

$$\frac{\partial W_L}{\partial C^-_{l,L}} = \alpha\beta\psi\mu^-_l[\mu_h(t_R - t_L)\Delta\omega + \Delta\rho^2]. \tag{3.36}$$

$$\frac{\partial W_L}{\partial C^+_{h,L}} = \alpha\beta\psi\mu^+_h[-\mu_l(t_R - t_L)\Delta\omega - \Delta\rho^2]. \tag{3.37}$$

$$\frac{\partial W_L}{\partial C^-_{h,L}} = \alpha\beta\psi\mu^-_h[-\mu_l(t_R - t_L)\Delta\omega + \Delta\rho^2]. \tag{3.38}$$

Since $\frac{\partial W_L}{\partial C^+_{h,L}} < 0$, $C^+_{h,L}$ must be 0. Since $\mu^-_l > \mu^-_h$, we have $\frac{\partial W_L}{\partial C^-_{l,L}} > \frac{\partial W_L}{\partial C^-_{h,L}}$. Also, since $\mu^+_l = \mu^-_l$, we have $\frac{\partial W_L}{\partial C^-_{l,L}} > \frac{\partial W_L}{\partial C^+_{l,L}}$. Therefore, in equilibrium, $C^-_{l,L} = 1$ must hold. Along the same logic, we can check that (a) if $m_R = 1$, $C^-_{l,R} = 1$ and (b) if $m_R = -1$, $C^+_{h,R} = 1$.

By differentiating W_L with respect to m_L, we have the condition that L chooses $m_L = 1$ as follows.

$$\begin{aligned}
&\left.\frac{\partial W_L}{\partial m_L}\right|_{\oplus} > \left.\frac{\partial W_L}{\partial m_L}\right|_{\ominus} \\
&\Leftrightarrow \beta\psi\mu^+_h[\mu_l(t_R - t_L)\Delta\omega + \Delta\rho^2] > \alpha\beta\psi\mu^-_l[\mu_h(t_R - t_L)\Delta\omega + \Delta\rho^2] \\
&\Leftrightarrow \underline{\Omega} = \frac{\mu_l\mu_h(t_R - t_L)\Delta\omega + \Delta\rho^2\mu_h}{\mu_l\mu_h(t_R - t_L)\Delta\omega + \Delta\rho^2\mu_l} > \alpha.
\end{aligned} \tag{3.39}$$

Also, by differentiating W_R with respect to m_R, we have the condition that R chooses $m_L = 1$ as follows.

$$\begin{aligned}
&\left.\frac{\partial W_R}{\partial m_R}\right|_{\oplus} > \left.\frac{\partial W_R}{\partial m_R}\right|_{\ominus} \\
&\Leftrightarrow \beta\psi\mu^-_l[\mu_h(t_R - t_L)\Delta\omega + \Delta\rho^2] > \alpha\beta\psi\mu^+_h[\mu_l(t_R - t_L)\Delta\omega + \Delta\rho^2] \\
&\Leftrightarrow \overline{\Omega} = \frac{\mu_l\mu_h(t_R - t_L)\Delta\omega + \Delta\rho^2\mu_l}{\mu_l\mu_h(t_R - t_L)\Delta\omega + \Delta\rho^2\mu_h} > \alpha.
\end{aligned} \tag{3.40}$$

Then, we obtain the result of the case of (ii) $t_L < t_R$. $\square$

C.3. Proof of Lemma 3.1

First, we compare $W_L(\underline{t}_L, \bar{t}_R)$ and $W_L(\bar{t}_L, \bar{t}_R)$. By Proposition 3.1, if $(\underline{t}_L, \bar{t}_R)$ holds, $m_L = -1, m_R = 1$, and $C^-_{l,L} = C^-_{l,R} = 1$. Then, the salience weights of each voter would be

$$s_l^- = \theta + 2\beta(1-\alpha) = s^T. \tag{3.41}$$

$$s_l^+ = s_h^+ = s_h^- = \theta + \beta(1-\alpha) = s^N, \tag{3.42}$$

where T represents target and N represents non-target. Then, $W_L(\underline{t}_L, \bar{t}_R)$ can be calculated as

$$\begin{aligned} W_L(\underline{t}_L, \bar{t}_R) =& \mu_l^+ \psi\{-s^N[\mu_h \Delta\omega(\bar{t}_R - \underline{t}_L)] - (1-s^N)\Delta\rho^2\} \\ &+ \mu_l^- \psi\{-s^T[\mu_h \Delta\omega(\bar{t}_R - \underline{t}_L)] + (1-s^T)\Delta\rho^2\} \\ &+ \mu_h^+ \psi\{s^N[\mu_l \Delta\omega(\bar{t}_R - \underline{t}_L)] - (1-s^N)\Delta\rho^2\} \\ &+ \mu_h^- \psi\{s^N[\mu_l \Delta\omega(\bar{t}_R - \underline{t}_L)] + (1-s^N)\Delta\rho^2\} + \frac{1}{2} \\ &= \frac{1}{2}(s^N - s^T)\psi\mu_l\mu_h\Delta\omega(\bar{t}_R - \underline{t}_L) + \frac{1}{2}(s^N - s^T)\psi\mu_l\Delta\rho^2 + \frac{1}{2}. \end{aligned} \tag{3.43}$$

Next, we calculate $W_L(\bar{t}_L, \bar{t}_R)$. We note that by Proposition 3.1, $m_L = 1, m_R = -1$, and $C^+_{l,L} = C^+_{l,R} = 1$. Then, the salience weights of each voter would be

$$s_l^+ = \theta + 2\beta(1-\alpha) = s^T. \tag{3.44}$$

$$s_l^- = s_h^+ = s_h^- = \theta + \beta(1-\alpha) = s^N. \tag{3.45}$$

Then, $W_L(\bar{t}_L, \bar{t}_R)$ can be calculated as

$$
\begin{aligned}
W_L(\bar{t}_L, \bar{t}_R) =& \mu_l^+ \psi\{s^T[\mu_h \Delta\omega(\bar{t}_L - \bar{t}_R)] - (1 - s^T)\Delta\rho^2\} \\
&+ \mu_l^- \psi\{s^N[\mu_h \Delta\omega(\bar{t}_L - \bar{t}_R)] + (1 - s^N)\Delta\rho^2\} \\
&+ \mu_h^+ \psi\{-s^N[\mu_l \Delta\omega(\bar{t}_L - \bar{t}_R)] - (1 - s^N)\Delta\rho^2\} \\
&+ \mu_h^- \psi\{-s^N[\mu_l \Delta\omega(\bar{t}_L - \bar{t}_R)] + (1 - s^N)\Delta\rho^2\} + \frac{1}{2} \\
&= \frac{1}{2}(s^T - s^N)\psi\mu_l\mu_h\Delta\omega(\bar{t}_L - \bar{t}_R) + \frac{1}{2}(s^T - s^N)\psi\mu_l\Delta\rho^2 + \frac{1}{2}.
\end{aligned} \tag{3.46}
$$

Then, $W_L(\underline{t}_L, \bar{t}_R) > W_L(\bar{t}_L, \bar{t}_R)$ holds if

$$
\begin{aligned}
& W_L(\underline{t}_L, \bar{t}_R) > W_L(\bar{t}_L, \bar{t}_R) \\
& \Leftrightarrow \frac{1}{2}(s^N - s^T)\psi\mu_l\mu_h\Delta\omega(\bar{t}_R - \underline{t}_L) + \frac{1}{2}(s^N - s^T)\psi\mu_l\Delta\rho^2 + \frac{1}{2} \\
& > \frac{1}{2}(s^T - s^N)\psi\mu_l\mu_h\Delta\omega(\bar{t}_L - \bar{t}_R) + \frac{1}{2}(s^T - s^N)\psi\mu_l\Delta\rho^2 + \frac{1}{2} \\
& \Leftrightarrow (s^N - s^T)\mu_l\mu_h\Delta\omega(\bar{t}_L - \underline{t}_L) + 2(s^N - s^T)\mu_l\Delta\rho^2 > 0 \\
& \Leftrightarrow (\alpha - 1)[\mu_h\Delta\omega(\bar{t}_L - \underline{t}_L) + 2\Delta\rho^2] > 0.
\end{aligned} \tag{3.47}
$$

Therefore, if $\alpha > 1$, $W_L(\underline{t}_L, \bar{t}_R) > W_L(\bar{t}_L, \bar{t}_R)$ and if $\alpha < 1$, $W_L(\underline{t}_L, \bar{t}_R) < W_L(\bar{t}_L, \bar{t}_R)$.

Next, we investigate that the relationship between $W_R(\underline{t}_L, \bar{t}_R)$ and $W_R(\underline{t}_L, \underline{t}_R)$. Along the same logic with L, $W_R(\underline{t}_L, \bar{t}_R)$ can be calculated as

$$
\begin{aligned}
W_R(\underline{t}_L, \bar{t}_R) =& \mu_l^+ \psi\{s^N[\mu_h \Delta\omega(\bar{t}_R - \underline{t}_L)] + (1 - s^N)\Delta\rho^2\} \\
&+ \mu_l^- \psi\{s^T[\mu_h \Delta\omega(\bar{t}_R - \underline{t}_L)] - (1 - s^T)\Delta\rho^2\} \\
&+ \mu_h^+ \psi\{-s^N[\mu_l \Delta\omega(\bar{t}_R - \underline{t}_L)] + (1 - s^N)\Delta\rho^2\} \\
&+ \mu_h^- \psi\{-s^N[\mu_l \Delta\omega(\bar{t}_R - \underline{t}_L)] - (1 - s^N)\Delta\rho^2\} + \frac{1}{2} \\
&= \frac{1}{2}(s^T - s^N)\psi\mu_l\mu_h\Delta\omega(\bar{t}_R - \underline{t}_L) + \frac{1}{2}(s^T - s^N)\psi\mu_l\Delta\rho^2 + \frac{1}{2}.
\end{aligned} \tag{3.48}
$$

Also, $W_R(\underline{t}_L, \underline{t}_R)$ can be calculated as

$$
\begin{aligned}
W_R(\underline{t}_L, \underline{t}_R) =& \mu_l^+ \psi\{-s^T[\mu_h \Delta\omega(\underline{t}_L - \underline{t}_R)] + (1-s^T)\Delta\rho^2\} \\
&+ \mu_l^- \psi\{-s^N[\mu_h \Delta\omega(\underline{t}_L - \underline{t}_R)] - (1-s^N)\Delta\rho^2\} \\
&+ \mu_h^+ \psi\{s^N[\mu_l \Delta\omega(\underline{t}_L - \underline{t}_R)] + (1-s^N)\Delta\rho^2\} \\
&+ \mu_h^- \psi\{s^N[\mu_l \Delta\omega(\underline{t}_L - \underline{t}_R)] - (1-s^N)\Delta\rho^2\} + \frac{1}{2} \\
&= \frac{1}{2}(s^N - s^T)\psi\mu_l\mu_h\Delta\omega(\underline{t}_L - \underline{t}_R) + \frac{1}{2}(s^N - s^T)\psi\mu_l\Delta\rho^2 + \frac{1}{2}. \qquad (3.49)
\end{aligned}
$$

Therefore, $W_R(\underline{t}_L, \bar{t}_R) > W_R(\underline{t}_L, \underline{t}_R)$ holds if

$$
\begin{aligned}
& W_R(\underline{t}_L, \bar{t}_R) > W_R(\underline{t}_L, \underline{t}_R) \\
& \Leftrightarrow \frac{1}{2}(s^T - s^N)\psi\mu_l\mu_h\Delta\omega(\bar{t}_R - \underline{t}_L) + \frac{1}{2}(s^T - s^N)\psi\mu_l\Delta\rho^2 + \frac{1}{2} \\
& > \frac{1}{2}(s^N - s^T)\psi\mu_l\mu_h\Delta\omega(\underline{t}_L - \underline{t}_R) + \frac{1}{2}(s^N - s^T)\psi\mu_l\Delta\rho^2 + \frac{1}{2} \\
& \Leftrightarrow (s^T - s^N)\mu_l\mu_h\Delta\omega(\bar{t}_R - \underline{t}_R) + 2(s^T - s^N)\mu_l\Delta\rho^2 > 0 \\
& \Leftrightarrow (1-\alpha)[\mu_h\Delta\omega(\bar{t}_R - \underline{t}_R) + 2\Delta\rho^2] > 0. \qquad (3.50)
\end{aligned}
$$

Then, if $\alpha > 1$, $W_R(\underline{t}_L, \bar{t}_R) < W_R(\underline{t}_L, \underline{t}_R)$ and if $\alpha < 1$, $W_R(\underline{t}_L, \bar{t}_R) > W_R(\underline{t}_L, \underline{t}_R)$. □

C.4. Proof of Proposition 3.2

By Lemma 3.1, $(\underline{t}_L, \bar{t}_R)$ cannot be an equilibrium because either one of the parties has an incentive to deviate. Therefore, potential equilibrium are $(\bar{t}_L, \bar{t}_R)$, $(\underline{t}_L, \underline{t}_R)$, and $(\bar{t}_L, \underline{t}_R)$. Note that in each pair, $t_L > t_R$ holds.

In the following, we check the deviation condition in each potential equilibrium. Since $t_L > t_R$, in *Case D*, party L chooses $m_L = 1$, $C_l^+ = 1$ and party R chooses $m_R = -1$, $C_l^+ = 1$. Then, voters' salience weights after priming are

$$s_l^+ = \theta + 2\beta(1-\alpha). \qquad (3.51)$$

$$s_l^- = s_h^+ = s_h^- = \theta + \beta(1-\alpha). \qquad (3.52)$$

By differentiating W_L with respect to t_L, we have

$$
\begin{aligned}
\frac{\partial W_L}{\partial t_L} &= \psi\mu_l^+\mu_h\Delta\omega[\theta + 2\beta(1-\alpha)] + \psi\mu_l^-\mu_h\Delta\omega[\theta + \beta(1-\alpha)] \\
&\quad - \psi\mu_h^+\mu_l\Delta\omega[\theta + \beta(1-\alpha)] - \psi\mu_h^-\mu_l\Delta\omega[\theta + \beta(1-\alpha)] \\
&= \psi\mu_l^+\mu_h\Delta\omega\beta(1-\alpha). \qquad (3.53)
\end{aligned}
$$

Also, by differentiating W_R with respect to t_R, we have

$$
\begin{aligned}
\frac{\partial W_R}{\partial t_R} &= \psi\mu_l^+\mu_h\Delta\omega[\theta + 2\beta(1-\alpha)] + \psi\mu_l^-\mu_h\Delta\omega[\theta + \beta(1-\alpha)] \\
&\quad - \psi\mu_h^+\mu_l\Delta\omega[\theta + \beta(1-\alpha)] - \psi\mu_h^-\mu_l\Delta\omega[\theta + \beta(1-\alpha)] \\
&= \psi\mu_l^+\mu_h\Delta\omega\beta(1-\alpha). \qquad (3.54)
\end{aligned}
$$

Therefore, as far as $t_L > t_R$ holds, $\frac{\partial W_L}{\partial t_L} = \frac{\partial W_R}{\partial t_R}$. Then, $(\bar{t}_L, \underline{t}_R)$ cannot be an equilibrium: If either party changes tax rates, $t_L > t_R$ still holds. Since $\alpha \neq 1$, either one of the parties has an incentive to deviate.

Next, we suppose that $\alpha > 1$. By Lemma 3.1, $(\bar{t}_L, \bar{t}_R)$ cannot be an equilibrium because L has an incentive to deviate. On the other hand, $(\underline{t}_L, \underline{t}_R)$ is an equilibrium: By Lemma 3.1, R does not have the incentive to deviate to $\bar{t}_R$. Also, L does not have incentive to deviate to $\bar{t}_L$ because $\frac{\partial W_L}{\partial t_L} < 0$ holds as far as $t_L > t_R$ and $\alpha > 1$.

Finally, we suppose that $\alpha < 1$. By Lemma 3.1, $(\underline{t}_L, \underline{t}_R)$ cannot be an equilibrium because R has an incentive to deviate to $\bar{t}_R$. Then, $(\bar{t}_L, \bar{t}_R)$ is an equilibrium: By Lemma 3.1, L does not have the incentive to deviate to $\underline{t}_L$. Also, R does not have incentive to deviate to $\underline{t}_R$ because $\frac{\partial W_R}{\partial t_R} > 0$ holds as far as $t_L > t_R$ and $\alpha < 1$. $\square$

C.5. Proof of Lemma 3.2

(i) *Case C1* holds for any pairs of (t_L, t_R)

First, we demonstrate that $W_L(\underline{t}_L, \bar{t}_R) > W_L(\bar{t}_L, \bar{t}_R)$. We suppose that $(\underline{t}_L, \bar{t}_R)$ holds. Then, by Proposition 3.1, $m_L = m_R = -1$ and $C_{l,L}^- = C_{h,R}^+ = 1$. Therefore, each voter's salience weight is

$$s_l^- = s_h^+ = \theta - 3\alpha\beta = s^T. \tag{3.55}$$

$$s_l^+ = s_h^- = \theta - 2\alpha\beta = s^N. \tag{3.56}$$

Then, $W_L(\underline{t}_L, \bar{t}_R)$ can be calculated as

$$\begin{aligned}
W_L(\underline{t}_L, \bar{t}_R) =& \mu_l^+ \psi\{-s^N[\mu_h \Delta\omega(\bar{t}_R - \underline{t}_L)] - (1 - s^N)\Delta\rho^2\} \\
&+ \mu_l^- \psi\{-s^T[\mu_h \Delta\omega(\bar{t}_R - \underline{t}_L)] + (1 - s^T)\Delta\rho^2\} \\
&+ \mu_h^+ \psi\{s^T[\mu_l \Delta\omega(\bar{t}_R - \underline{t}_L)] - (1 - s^T)\Delta\rho^2\} \\
&+ \mu_h^- \psi\{s^N[\mu_l \Delta\omega(\bar{t}_R - \underline{t}_L)] + (1 - s^N)\Delta\rho^2\} + \frac{1}{2} \\
=& \frac{1}{2}\mu_l \psi(s^N - s^T)\Delta\rho^2 + \frac{1}{2}\mu_h \psi(s^T - s^N)\Delta\rho^2 + \frac{1}{2}.
\end{aligned} \tag{3.57}$$

Next, suppose that $(\bar{t}_L, \bar{t}_R)$ holds. Then, by Proposition 3.1, $m_L = m_R = -1$ and $C_{h,L}^- = C_{l,R}^+ = 1$ hold. Therefore, each voter's salience weight is

$$s_l^+ = s_h^- = \theta - 3\alpha\beta = s^T. \tag{3.58}$$

$$s_l^- = s_h^+ = \theta - 2\alpha\beta = s^N. \tag{3.59}$$

Then, $W_L(\bar{t}_L, \bar{t}_R)$ can be calculated as

$$\begin{aligned}
W_L(\bar{t}_L, \bar{t}_R) =& \mu_l^+ \psi\{s^T[\mu_h \Delta\omega(\bar{t}_L - \bar{t}_R)] - (1 - s^T)\Delta\rho^2\} \\
&+ \mu_l^- \psi\{s^N[\mu_h \Delta\omega(\bar{t}_L - \bar{t}_R)] + (1 - s^N)\Delta\rho^2\} \\
&+ \mu_h^+ \psi\{-s^N[\mu_l \Delta\omega(\bar{t}_L - \bar{t}_R)] - (1 - s^N)\Delta\rho^2\} \\
&+ \mu_h^- \psi\{-s^T[\mu_l \Delta\omega(\bar{t}_L - \bar{t}_R)] + (1 - s^T)\Delta\rho^2\} + \frac{1}{2} \\
=& \frac{1}{2}\mu_l \psi(s^T - s^N)\Delta\rho^2 + \frac{1}{2}\mu_h \psi(s^N - s^T)\Delta\rho^2 + \frac{1}{2}.
\end{aligned} \tag{3.60}$$

Therefore, $W_L(\underline{t}_L, \bar{t}_R) > W_L(\bar{t}_L, \bar{t}_R)$ holds because

$$
\begin{aligned}
&\frac{1}{2}\mu_l\psi(s^N - s^T)\Delta\rho^2 + \frac{1}{2}\mu_h\psi(s^T - s^N)\Delta\rho^2 + \frac{1}{2} > \frac{1}{2}\mu_l\psi(s^T - s^N)\Delta\rho^2 + \frac{1}{2}\mu_h\psi(s^N - s^T)\Delta\rho^2 + \frac{1}{2}\\
&\Leftrightarrow \mu_l\psi(s^N - s^T)\Delta\rho^2 > \mu_h\psi(s^N - s^T)\Delta\rho^2\\
&\Leftrightarrow \mu_l > \mu_h. \qquad (3.61)
\end{aligned}
$$

Next, we demonstrate that $W_R(\underline{t}_L, \bar{t}_R) < W_R(\underline{t}_L, \underline{t}_R)$. $W_R(\underline{t}_L, \bar{t}_R)$ can be calculated as

$$
\begin{aligned}
W_R(\underline{t}_L, \bar{t}_R) =& \mu_l^+\psi\{s^N[\mu_h\Delta\omega(\bar{t}_R - \underline{t}_L)] + (1 - s^N)\Delta\rho^2\}\\
&+ \mu_l^-\psi\{s^T[\mu_h\Delta\omega(\bar{t}_R - \underline{t}_L)] - (1 - s^T)\Delta\rho^2\}\\
&+ \mu_h^+\psi\{-s^T[\mu_l\Delta\omega(\bar{t}_R - \underline{t}_L)] + (1 - s^T)\Delta\rho^2\}\\
&+ \mu_h^-\psi\{-s^N[\mu_l\Delta\omega(\bar{t}_R - \underline{t}_L)] - (1 - s^N)\Delta\rho^2\} + \frac{1}{2}\\
&= \frac{1}{2}\mu_l\psi(s^T - s^N)\Delta\rho^2 + \frac{1}{2}\mu_h\psi(s^N - s^T)\Delta\rho^2 + \frac{1}{2}. \qquad (3.62)
\end{aligned}
$$

However, $W_R(\underline{t}_L, \underline{t}_R)$ can be calculated as

$$
\begin{aligned}
W_R(\underline{t}_L, \underline{t}_R) =& \mu_l^+\psi\{-s^T[\mu_h\Delta\omega(\underline{t}_L - \underline{t}_R)] + (1 - s^T)\Delta\rho^2\}\\
&+ \mu_l^-\psi\{-s^N[\mu_h\Delta\omega(\underline{t}_L - \underline{t}_R)] - (1 - s^N)\Delta\rho^2\}\\
&+ \mu_h^+\psi\{s^N[\mu_l\Delta\omega(\underline{t}_L - \underline{t}_R)] + (1 - s^N)\Delta\rho^2\}\\
&+ \mu_h^-\psi\{s^T[\mu_l\Delta\omega(\underline{t}_L - \underline{t}_R)] - (1 - s^T)\Delta\rho^2\} + \frac{1}{2}\\
&\Leftrightarrow \frac{1}{2}\mu_l\psi(s^N - s^T)\Delta\rho^2 + \frac{1}{2}\mu_h\psi(s^T - s^N)\Delta\rho^2 + \frac{1}{2}. \qquad (3.63)
\end{aligned}
$$

Then, $W_R(\underline{t}_L, \bar{t}_R) < W_R(\underline{t}_L, \underline{t}_R)$ holds because

$$
\begin{aligned}
&\frac{1}{2}\mu_l\psi(s^T - s^N)\Delta\rho^2 + \frac{1}{2}\mu_h\psi(s^N - s^T)\Delta\rho^2 + \frac{1}{2} < \frac{1}{2}\mu_l\psi(s^N - s^T)\Delta\rho^2 + \frac{1}{2}\mu_h\psi(s^T - s^N)\Delta\rho^2 + \frac{1}{2}\\
&\Leftrightarrow \mu_l(s^T - s^N)\Delta\rho^2 < \mu_h(s^T - s^N)\Delta\rho^2\\
&\Leftrightarrow \mu_l > \mu_h. \qquad (3.64)
\end{aligned}
$$

(ii) *Case C2* holds for any pairs of (t_L, t_R)

In the following, we demonstrate that $W_L(\underline{t}_L, \bar{t}_R) < W_L(\bar{t}_L, \bar{t}_R)$. First, we calculate $W_L(\underline{t}_L, \bar{t}_R)$. By Proposition 3.1, $m_L = m_R = 1$ and $C^+_{h,L} = C^-_{l,R} = 1$ holds. Then, the voters' salience weights are

$$s_l^- = s_h^+ = \theta + 3\beta = s^T \tag{3.65}$$

$$s_l^+ = s_h^- = \theta + 2\beta = s^N. \tag{3.66}$$

Then, $W_L(\underline{t}_L, \bar{t}_R)$ can be calculated as

$$\begin{aligned} W_L(\underline{t}_L, \bar{t}_R) =& \mu_l^+ \psi\{-s^N[\mu_h \Delta\omega(\bar{t}_R - \underline{t}_L)] - (1 - s^N)\Delta\rho^2\} \\ &+ \mu_l^- \psi\{-s^T[\mu_h \Delta\omega(\bar{t}_R - \underline{t}_L)] + (1 - s^T)\Delta\rho^2\} \\ &+ \mu_h^+ \psi\{s^T[\mu_l \Delta\omega(\bar{t}_R - \underline{t}_L)] - (1 - s^T)\Delta\rho^2\} \\ &+ \mu_h^- \psi\{s^N[\mu_l \Delta\omega(\bar{t}_R - \underline{t}_L)] + (1 - s^N)\Delta\rho^2\} + \frac{1}{2} \\ =& \frac{1}{2}\mu_l \psi(s^N - s^T)\Delta\rho^2 + \frac{1}{2}\mu_h \psi(s^T - s^N)\Delta\rho^2 + \frac{1}{2}. \end{aligned} \tag{3.67}$$

Next, we calculate $W_L(\bar{t}_L, \bar{t}_R)$. By Proposition 3.1, $m_L = m_R = 1$ and $C^+_{l,L} = C^-_{h,R} = 1$ holds. Then, the voters' salience weights are

$$s_l^+ = s_h^- = \theta + 3\beta = s^T \tag{3.68}$$

$$s_l^- = s_h^+ = \theta + 2\beta = s^N. \tag{3.69}$$

Then, $W_L(\bar{t}_L, \bar{t}_R)$ can be calculated as

$$
\begin{aligned}
W_L(\bar{t}_L,\bar{t}_R) =& \mu_l^+\psi\{s^T[\mu_h\Delta\omega(\bar{t}_L-\bar{t}_R)]-(1-s^T)\Delta\rho^2\} \\
&+\mu_l^-\psi\{s^N[\mu_h\Delta\omega(\bar{t}_L-\bar{t}_R)]+(1-s^N)\Delta\rho^2\} \\
&+\mu_h^+\psi\{-s^N[\mu_l\Delta\omega(\bar{t}_L-\bar{t}_R)]-(1-s^N)\Delta\rho^2\} \\
&+\mu_h^-\psi\{-s^T[\mu_l\Delta\omega(\bar{t}_L-\bar{t}_R)]+(1-s^T)\Delta\rho^2\}+\frac{1}{2} \\
&=\frac{1}{2}\mu_l\psi(s^T-s^N)\Delta\rho^2+\frac{1}{2}\mu_h\psi(s^N-s^T)\Delta\rho^2+\frac{1}{2}. \qquad (3.70)
\end{aligned}
$$

Then, we can check that $W_L(\underline{t}_L,\bar{t}_R) < W_L(\bar{t}_L,\bar{t}_R)$ because

$$
\begin{aligned}
&\frac{1}{2}\mu_l\psi(s^N-s^T)\Delta\rho^2+\frac{1}{2}\mu_h\psi(s^T-s^N)\Delta\rho^2+\frac{1}{2} < \frac{1}{2}\mu_l\psi(s^T-s^N)\Delta\rho^2+\frac{1}{2}\mu_h\psi(s^N-s^T)\Delta\rho^2+\frac{1}{2} \\
&\Leftrightarrow \mu_l(s^N-s^T)\Delta\rho^2 < \mu_h(s^N-s^T)\Delta\rho^2 \\
&\Leftrightarrow \mu_l > \mu_h. \qquad (3.71)
\end{aligned}
$$

Next, we demonstrate that $W_R(\underline{t}_L,\bar{t}_R) > W_R(\underline{t}_L,\underline{t}_R)$. First, we calculate $W_R(\underline{t}_L,\bar{t}_R)$. Along the same logic of L, $W_R(\underline{t}_L,\bar{t}_R)$ can be calculated as

$$
\begin{aligned}
W_R(\underline{t}_L,\bar{t}_R) =& \mu_l^+\psi\{s^N[\mu_h\Delta\omega(\bar{t}_R-\underline{t}_L)]+(1-s^N)\Delta\rho^2\} \\
&+\mu_l^-\psi\{s^T[\mu_h\Delta\omega(\bar{t}_R-\underline{t}_L)]-(1-s^T)\Delta\rho^2\} \\
&+\mu_h^+\psi\{-s^T[\mu_l\Delta\omega(\bar{t}_R-\underline{t}_L)]+(1-s^T)\Delta\rho^2\} \\
&+\mu_h^-\psi\{-s^N[\mu_l\Delta\omega(\bar{t}_R-\underline{t}_L)]-(1-s^N)\Delta\rho^2\}+\frac{1}{2} \\
&=\frac{1}{2}\mu_l\psi(s^T-s^N)\Delta\rho^2+\frac{1}{2}\mu_h\psi(s^N-s^T)\Delta\rho^2+\frac{1}{2}. \qquad (3.72)
\end{aligned}
$$

Also, $W_R(\underline{t}_L,\underline{t}_R)$ can be calculated as

$$
\begin{aligned}
W_R(\underline{t}_L, \underline{t}_R) =&\mu_l^+ \psi\{-s^T[\mu_h \Delta\omega(\underline{t}_L - \underline{t}_R)] + (1-s^T)\Delta\rho^2\} \\
&+ \mu_l^- \psi\{-s^N[\mu_h \Delta\omega(\underline{t}_L - \underline{t}_R)] - (1-s^N)\Delta\rho^2\} \\
&+ \mu_h^+ \psi\{s^N[\mu_l \Delta\omega(\underline{t}_L - \underline{t}_R)] + (1-s^N)\Delta\rho^2\} \\
&+ \mu_h^- \psi\{s^T[\mu_l \Delta\omega(\underline{t}_L - \underline{t}_R)] - (1-s^T)\Delta\rho^2\} + \frac{1}{2} \\
&= \frac{1}{2}\mu_l \psi(s^N - s^T)\Delta\rho^2 + \frac{1}{2}\mu_h \psi(s^T - s^N)\Delta\rho^2 + \frac{1}{2}. \qquad (3.73)
\end{aligned}
$$

Then, we can check that $W_R(\underline{t}_L, \bar{t}_R) > W_R(\underline{t}_L, \underline{t}_R)$ because

$$
\begin{aligned}
&\frac{1}{2}\mu_l \psi(s^T - s^N)\Delta\rho^2 + \frac{1}{2}\mu_h \psi(s^N - s^T)\Delta\rho^2 + \frac{1}{2} > \frac{1}{2}\mu_l \psi(s^N - s^T)\Delta\rho^2 + \frac{1}{2}\mu_h \psi(s^T - s^N)\Delta\rho^2 + \frac{1}{2} \\
&\Leftrightarrow \mu_l(s^T - s^N)\Delta\rho^2 > \mu_h(s^T - s^N)\Delta\rho^2 \\
&\Leftrightarrow \mu_l > \mu_h. \qquad (3.74)
\end{aligned}
$$

□

C.6. Proof of Proposition 3.3

(i) *Case C1* holds for any pairs of (t_L, t_R)

By Lemma 3.2 (i), $(\bar{t}_L, \bar{t}_R)$ and $(\underline{t}_L, \bar{t}_R)$ cannot be equilibrium because either L or R has an incentive to deviate. We check that both $(\bar{t}_L, \underline{t}_R)$ and $(\underline{t}_L, \underline{t}_R)$ can be equilibrium.

In each case, $t_L > t_R$ holds. Then, in equilibrium, party L proposes $m_L = -1$, $C^-_{h,L} = 1$ and party R proposes $m_R = -1$, $C^+_{l,R} = 1$. Therefore, voters' salience weights after priming are determined as

$$
s_l^+ = s_h^- = \theta - 3\alpha\beta. \qquad (3.75)
$$

$$
s_l^- = s_h^+ = \theta - 2\alpha\beta. \qquad (3.76)
$$

Then, by differentiating W_L with respect to t_L, we have

$$
\begin{aligned}
\frac{\partial W_L}{\partial t_L} &= \psi\mu_l^+(\theta - 3\alpha\beta)\mu_h\Delta\omega + \psi\mu_l^-(\theta - 2\alpha\beta)\mu_h\Delta\omega \\
&- \psi\mu_h^+(\theta - 2\alpha\beta)\mu_l\Delta\omega - \psi\mu_h^-(\theta - 3\alpha\beta)\mu_l\Delta\omega \\
&= 0. \qquad (3.77)
\end{aligned}
$$

Also, by differentiating W_R with respect to t_R, we have

$$
\begin{aligned}
\frac{\partial W_R}{\partial t_R} &= \psi\mu_l^+(\theta - 3\alpha\beta)\mu_h\Delta\omega + \psi\mu_l^-(\theta - 2\alpha\beta)\mu_h\Delta\omega \\
&- \psi\mu_h^+(\theta - 2\alpha\beta)\mu_l\Delta\omega - \psi\mu_h^-(\theta - 3\alpha\beta)\mu_l\Delta\omega \\
&= 0. \qquad (3.78)
\end{aligned}
$$

Suppose that $(\bar{t}_L, \underline{t}_R)$ is an equilibrium. If either party changes tax rates, $t_L > t_R$ still holds. Then, since $\frac{\partial W_L}{\partial t_L} = \frac{\partial W_R}{\partial t_R} = 0$, both parties do not have an incentive to deviate. Therefore, $(\bar{t}_L, \underline{t}_R)$ is an equilibrium.

Next, we suppose that $(\underline{t}_L, \underline{t}_R)$ is an equilibrium. By Lemma 3.2 (i), R is not incentivized to deviate. Also, L does not have an incentive to change $\bar{t}_L$ because if L changes tax policy, $t_L > t_R$ still holds and $\frac{\partial W_L}{\partial t_L} = 0$. Therefore, $(\underline{t}_L, \underline{t}_R)$ is an equilibrium.

The case (ii) *Case 2* holds for any pairs of (t_L, t_R) can be proved in the same way. □

Appendix D

D.1. Vote share calculation

As a complementary, in the following, we check the vote share calculation for v_l^-, v_h^+, v_h^- discussed in Section 3.3.1.

Low-income/liberal voters (v_l^-)

Voter k in group v_l^- votes for L if

$$s_l^-(m,C)[(1-t_L)\omega_l + t_L\omega^*] - [1-s_l^-(m,C)](\rho_L - \rho^-)^2$$
$$> s_l^-(m,C)[(1-t_R)\omega_l + t_R\omega^*] - [1-s_l^-(m,C)](\rho_R - \rho^-)^2 + \eta_{l,k}^-. \quad (3.79)$$

Then, we have

$$s_l^-(m,C)[\mu_h\Delta\omega(t_L - t_R)] + [1-s_l^-(m,C)]\Delta\rho^2 > \eta_{l,k}^-. \quad (3.80)$$

Since $\eta_{l,k}^-$ is uniformly distributed on $[\eta - \frac{1}{2\phi}, \eta + \frac{1}{2\phi}]$, the vote share of L in v_l^- can be calculated as

$$\phi\{s_l^-(m,C)[\mu_h\Delta\omega(t_L - t_R)] + [1-s_l^-(m,C)]\Delta\rho^2 + \frac{1}{2\phi} - \eta\}. \quad (3.81)$$

High-income/conservative voters (v_h^+)

Voter k in group v_h^+ votes for L if

$$s_h^+(m,C)[(1-t_L)\omega_h + t_L\omega^*] - [1-s_h^+(m,C)](\rho_L - \rho^+)^2$$
$$> s_h^+(m,C)[(1-t_R)\omega_h + t_R\omega^*] - [1-s_h^+(m,C)](\rho_R - \rho^+)^2 + \eta_{h,k}^+. \quad (3.82)$$

Then, we have

$$-s_h^+(m,C)[\mu_l\Delta\omega(t_L - t_R)] - [1-s_h^+(m,C)]\Delta\rho^2 > \eta_{h,k}^+. \quad (3.83)$$

Since $\eta_{h,k}^+$ is uniformly distributed on $[\eta - \frac{1}{2\phi}, \eta + \frac{1}{2\phi}]$, the vote share of L in v_h^+ can be calculated as

$$\phi\{-s_h^+(m,C)[\mu_l\Delta\omega(t_L - t_R)] - [1-s_h^+(m,C)]\Delta\rho^2 + \frac{1}{2\phi} - \eta\}. \quad (3.84)$$

High-income/liberal voters (v_h^-)

Voter k in group v_h^- votes for L if

$$s_h^-(m,C)[(1-t_L)\omega_h + t_L\omega^*] - [1-s_h^-(m,C)](\rho_L-\rho^-)^2$$
$$> s_h^-(m,C)[(1-t_R)\omega_h + t_R\omega^*] - [1-s_h^-(m,C)](\rho_R-\rho^-)^2 + \eta_{h,k}^-. \quad (3.85)$$

Then, we have

$$-s_h^-(m,C)[\mu_l\Delta\omega(t_L-t_R)] + [1-s_h^-(m,C)]\Delta\rho^2 > \eta_{h,k}^-. \quad (3.86)$$

Since $\eta_{h,k}^-$ is uniformly distributed on $[\eta-\frac{1}{2\phi}, \eta+\frac{1}{2\phi}]$, the vote share of L in v_h^- can be calculated as

$$\phi\{-s_h^-(m,C)[\mu_l\Delta\omega(t_L-t_R)] + [1-s_h^-(m,C)]\Delta\rho^2 + \frac{1}{2\phi} - \eta\}. \quad (3.87)$$

□

D.2. Discussion on the difference in responsiveness between income groups

As discussed in Section 3.3.1, in this model, high-income voters exhibit greater responsiveness to marginal changes in tax policies than low-income voters. This is one of the key mechanisms for understanding why political parties may opt for lower tax rates. We can verify this as follows: To simplify the discussion, let us assume that voters' salience weight toward an economic issue is set to a common fixed value $s > 0$. Then, the marginal effect of the tax rate on voters' payoff in each income group can be calculated as follows[55]:

$$\left|\frac{\partial v_h}{\partial t}\right| = s\mu_l(\omega_h-\omega_l) > s\mu_h(\omega_h-\omega_l) = \left|\frac{\partial v_l}{\partial t}\right|. \quad (3.88)$$

Intuitively, the difference stems from the fact that high-income voters lose more than low-income voters gain with respect to the tax rate change due to the assumption that $\mu_l > \mu_h$.

[55]We omit the difference in the social ideological positions of voters because the marginal payoff of the tax rate is determined regardless of their ideological positions.

We can also verify that the impact of the difference in income group sizes on winning probability dissipates due to differences in responsiveness. In the probabilistic voting model, the marginal effect of a policy change on winning probability is determined by the voters' group size multiplied by the marginal effect on voters' payoff. Consequently, the effect of each group's marginal payoff on winning probability concerning the tax rate can be calculated as follows:

$$\underbrace{\mu_h}_{\text{group size}} \times \left|\frac{\partial v_h}{\partial t}\right| = s\mu_h\mu_l(\omega_h - \omega_l) = \underbrace{\mu_l}_{\text{group size}} \times \left|\frac{\partial v_l}{\partial t}\right|. \tag{3.89}$$

Therefore, high-income and low-income voters have an equal impact on winning probability concerning tax rate changes as long as they share the same salience weights. This is a key mechanism behind Fact 3.2, which is discussed in Section 3.3.3. Moreover, when salience weights diversify among income groups due to political campaigns, this motivates parties to consider changing the tax rate, as explored in Proposition 3.2.

Conversely, the marginal payoff of social ideologies for each voter is the same across income groups. This implies that the difference in group size matters when it comes to the social ideological dimension. Intuitively, this leads to the conclusion that when social issues hold more significance than economic ones due to the polarization of social ideologies ($\Delta\rho$), the discrepancy in responsiveness to tax rates diminishes between income groups. Consequently, parties are more likely to target a low-income voter group during political campaigns due to their disparity in size ($\mu_l > \mu_h$). This is the reason behind the shift in parties' issue selection strategy caused by the polarization of social ideology, as discussed in Section 3.3.2, Fact 3.1 and Proposition 3.1. □

D.3. Discussion on Assumption 3.1

In the following section, we gain insight into how Assumption 3.1 functions to eliminate the possibility of parties targeting *core voters* in Stage 3 (proof of Proposition 3.1). Let us examine the case where $t_L > t_R$ and how group L determines its spending when it selects the message $m_L = -1$, indicating that it wants to convey that the "social issue is more important".

By differentiating winning probability W_L with respect to $C^j_{i,L}$, we have

$$\frac{\partial W_L}{\partial C_{l,L}^+} = \alpha\beta\psi\mu_l^+[-\mu_h(t_L - t_R)\Delta\omega - \Delta\rho^2]. \tag{3.90}$$

$$\frac{\partial W_L}{\partial C_{l,L}^-} = \alpha\beta\psi\mu_l^-[-\mu_h(t_L - t_R)\Delta\omega + \Delta\rho^2]. \tag{3.91}$$

$$\frac{\partial W_L}{\partial C_{h,L}^+} = \alpha\beta\psi\mu_h^+[\mu_l(t_L - t_R)\Delta\omega - \Delta\rho^2]. \tag{3.92}$$

$$\frac{\partial W_L}{\partial C_{h,L}^-} = \alpha\beta\psi\mu_h^-[\mu_l(t_L - t_R)\Delta\omega + \Delta\rho^2]. \tag{3.93}$$

Let us note that $\frac{\partial W_L}{\partial C_{l,L}^+} < 0$, and $\frac{\partial W_L}{\partial C_{h,L}^-} > \frac{\partial W_L}{\partial C_{h,L}^+}$. So, we have to check the relationship only between $\frac{\partial W_L}{\partial C_{h,L}^-}$ and $\frac{\partial W_L}{\partial C_{l,L}^-}$. We know that $\frac{\partial W_L}{\partial C_{h,L}^-} > \frac{\partial W_L}{\partial C_{l,L}^-}$ is true when Assumption 3.1 holds because:

$$\frac{\partial W_L}{\partial C_{h,L}^-} > \frac{\partial W_L}{\partial C_{l,L}^-}$$

$$\Leftrightarrow \underbrace{\mu_l\mu_h(t_L - t_R)\Delta\omega}_{(a)} + \underbrace{\mu_h\Delta\rho^2}_{(b)} > \underbrace{-\mu_l\mu_h(t_L - t_R)\Delta\omega}_{(c)} + \underbrace{\mu_l\Delta\rho^2}_{(d)} \tag{3.94}$$

$$\Leftrightarrow \frac{2\mu_l\mu_h\Delta\omega|t_L - t_R|}{\mu_l - \mu_h} > \Delta\rho^2. \tag{3.95}$$

We note the interpretation of (3.94): For the left-hand side, high-income/liberal voters prefer R's tax policy, while they prefer L's social ideological position, i.e., they are *swing voters*. Therefore, when high-income/liberal voters shift their attention from an economic issue, it can benefit L in both dimensions: The strategy can divert high-income/liberal voters' attention from the economic issue (disadvantageous for L), as represented in (a), while it leads voters to shift their attention to the social issue (advantageous for L), as represented in (b). On the other hand, for the right-hand side of (3.94), low-income/liberal voters prefer both L's tax policy and social ideological position, i.e., they are *core voters* for L. Then, when low-income/liberal voters shift their attention from an economic issue to a social issue, there is a trade-off: The strategy can lead low-income/liberal voters to shift more attention to the social issue (advantageous for L), as represented in (d), while it moves voters' attention away from the economic issue (also advantageous for L), as represented in (c). Therefore, as long as voters pay attention to both policy dimensions, parties have an incentive to attract *swing voters*' attention rather than *core voters*.

However, when $\Delta\rho$ is sufficiently large (i.e., Assumption 3.1 is violated), this is not necessarily true. In this case, L virtually omits terms (a) and (c). Then, what only matters is group size, μ_l and μ_h. Since $\mu_l > \mu_h$ holds, L attempts to attract attention from low-income/liberal voters, i.e., *core voters*. Intuitively, this only happens when $\Delta\rho$ is large, not $\Delta\omega$. As discussed in Section 3.3.1, high-income voters are more responsive to the economic dimension, which makes the effect of a political campaign on high-income voters significant despite their small group size. On the other hand, the same logic does not apply to the social ideology dimension. This means that the difference in group size ($\mu_l > \mu_h$) significantly matters when voters value a social issue. Therefore, parties have an incentive to target low-income core voters when $\Delta\rho$ is large. $\square$

4 Law enforcement and political misinformation

4.1 Introduction

For decades, developed countries have witnessed an increase in the punitiveness of law enforcement, as evidenced by both the incarceration rate and the severity of penalties (Lacey et al., 2018). One notable case is the phenomenon of *mass incarceration* in the United States, which denotes a substantial surge in the incarceration rate, defined as the number of inmates per 100,000 residents. Initially, the disparity between the United States and other developed countries in incarceration rates was not particularly pronounced. However, starting in the 1970s, the United States underwent a striking escalation in its incarceration rate, which peaked around 2010. While there has been a recent decline in the incarceration rate, attributed in part to the pandemic, decreasing property crime rates, and shifts in prosecution and sentencing practices (Pew Research Center, 2021a), the United States still maintains the highest incarceration rate globally (see Table 4.1).[56]

Scholars have long debated the reasons for this trend, including rising crime rates, race, illegal drug use, and inequality (Barker, 2009; Campbell et al., 2015; Enns, 2014, 2016; Gottschalk, 2006, 2016; Jacobs and Jackson, 2010). Among several reasons, Enns (2014, 2016) argues that mass incarceration largely reflects a political response to the public's rising punitiveness. By using a longitudinal measure of the public's support for being tough on crime and controlling for other factors, he shows that the public's punitiveness has been a primary determinant of mass incarceration.

Why has the public become so punitive? One hypothesis is that the political discourse drives voters' misperceptions about the crime situation. Several surveys show that many people believe that the crime rate is rising, despite that the situation has improved for decades. For example, a Gallup survey in 2022 shows that 78% of U.S. adults believe that crime is up from the previous year, which does not match reality.[57][58] Additionally, Ramirez (2013a,b) shows

[56]Pew Research Center (2021a) reports that America's incarceration rate fell in 2020 to the lowest level since 1995. They identified several factors contributing to this phenomenon: (i) the coronavirus pandemic, (ii) a sharp decline in property crime rates, and (iii) changes in criminal laws, prosecution, and judicial sentencing patterns. However, it remains unclear how these factors affected the recent downward trajectory. They also report that the U.S. incarcerates a larger share of its population than any other country for which data are available.

[57]`https://news.gallup.com/poll/404048/record-high-perceive-local-crime-increased.aspx`.

[58]Survey results may be an inaccurate estimation of voters' misperception because of ambiguous wording and the period and geographical area in question. However, Esberg and Mummolo (2018) show that even after controlling for those factors, voters' belief about the crime rate is much higher than the reality.

Year	United States	Canada	United Kingdom (England & Wales)	Germany	France	Australia	New Zealand
1970	161	104	80	-	57	82	83
1980	220	96	87	-	66	66	83
1990	457	121 (1990-91)	90	-	78	84	116
2000	683	115 (2000-01)	124	85	82	114	148
2010	731	117 (2009-11)	153	85	99 (2011)	135	198
2020	505	104 (2019)	133	72	119	160	186

Source: World Prison Brief

Notes: https://www.prisonstudies.org/world-prison-brief-data, accessed June 2023

Table 4.1: Incarceration rate in developed countries (prison population rate per 100,000)

that the presidential framing of crime, especially the punitive tone of presidential statements, increases the public's punitive sentiment. Jacobs and Jackson (2010) argue that law-and-order campaign appeals by Republicans are the most plausible reason for the public punitive sentiment and the rapid increase in U.S. imprisonment rates. Survey results may also support this idea. For example, in the 2016 presidential election, Donald Trump argued that the crime situation was becoming severe and blamed undocumented immigrants for committing crimes and causing violence. The survey results show that 78% of Trump supporters believed that crime had worsened but that only 37% of Clinton supporters did, which indicates that political discourse may affect voters' perceptions of crime (Pew Research Center, 2016). Furthermore, the aforementioned Gallup survey also highlights a partisan disparity in the perception of the crime situation. Specifically, 73% of Republicans responded that there was an increase in crime compared to the previous year in their local area, whereas only 42% of Democrats shared the same perception.

However, even if voters' perceptions and attitudes are malleable, it remains unclear why political campaigns enhance the public's punitive attitude and lead politicians to implement harsh law enforcement. In the 2016 presidential election, for example, Trump emphasized the seriousness of crime and the need to implement harsh enforcement, but Clinton instead emphasized the problem of mass incarceration and the need to reform the criminal justice system, including easing mandatory minimum sentences for offenders (Hill and Marion, 2018). If each party emphasizes the crime situation in different directions—one party overstates the situation, but another party attempts to correct it—it is unclear why the total effect of political campaigns leads to the public's punitive attitude and punitive law enforcement policy. Are there any factors that foster punitiveness underlying the political process?

To address this question, this study develops a law enforcement model incorporating political competition and examines the influence of political parties' campaigns on voters' perceptions of criminal harm and the resulting equilibrium law enforcement policy. Our model incorporates political parties, voters (i.e., victims), and criminals. Specifically, we assume that voters' marginal disutility increases with respect to the harm caused by crime, which is the standard assumption in the law and economics literature (Becker, 1968; Stigler, 1970). In a political context, we employ two theories: the first is a probabilistic voting model (Lindbeck and Weibull, 1987; Persson and Tabellini, 2002). The second is an issue ownership theory that assumes that one party has accumulated reputation/expertise on a certain issue, enabling them to more efficiently implement a policy on this issue (Petrocik, 1996). Then, we allow parties to manipulate voters' beliefs regarding the severity of crime harm through political campaigns. Consequently, uninformed voters, who lack sufficient information about the crime situation, adjust their beliefs based on the extent of each political party's campaign.

We demonstrate that in equilibrium, the party with issue ownership on policing crime has an incentive to exaggerate the severity of criminal harm, while the opposing party has the incentive to rectify this misinformation. However, despite the parties' contrasting strategies of misinformation and correction regarding the crime situation, we discover that the overall effect of political campaigns tends to steer both parties' law enforcement policies toward harsher measures than in the absence of a political campaign.

The mechanism behind our main result comes from the combination of probabilistic voting and the assumption of increasing marginal disutility of voters regarding criminal harm. In an equilibrium, certain groups of voters become excessively fearful of harm through manipulation, while others become relatively less concerned about crime. Consequently, one might intuitively anticipate that these opposing effects of information manipulation cancel each other out. However, within this model, voters experience an increase in marginal disutility as the level of harm escalates. Therefore, the impact on the group of voters exhibiting greater fear outweighs that of the group with lesser fear. Under the probabilistic voting model, politicians respond to the average payoff of voters. As a total effect of political campaigns raises the average voter's disutility due to crime, the resulting law enforcement tends to be punitive, even when the campaigns of both parties manipulate voters' perceptions in opposing directions to the same extent. This mechanism can be more intuitively explained as follows: since voters are risk averse, they are more influenced by discourse suggesting that "crime rates are rising and growing more severe" than by "crime rates are declining and becoming less severe."

Adopting a theoretical perspective from the law and economics literature, this study has a similar motivation to the Beckerian law enforcement model, e.g., Becker (1968), Garoupa (1997), and Polinsky and Shavell (2000), and its extension to exploring effects of self-interested law enforcers, e.g., Stigler (1970), Friedman (1999), Garoupa and Klerman (2002), and Yahagi (2018). In particular, this study can be seen as an extension of law enforcement models with political competition such as in Langlais and Obidzinski (2017), Mungan (2017), Obidzinski (2019), Friehe and Mungan (2021), Yahagi (2021), Yahagi and Yamaguchi (2023). The most similar contribution is Langlais and Obidzinski (2017), who apply the Downs model with certainty to investigate the impact of political decision-making processes on law enforcement policies.

In the current study, we extend these models in three ways. First, different from the Downs model with certainty used in Langlais and Obidzinski (2017), we employ a probabilistic voting model (Persson and Tabellini, 2002; Lindbeck and Weibull, 1987) to avoid a median voter equilibrium.[59] Second, we incorporate issue ownership by parties, which means that one party has a reputation for competence in handling a particular issue (Petrocik, 1996; Petrocik et al., 2003; Krasa and Polborn, 2010b). In our setting, one party has a reputation for competence in policing crime, which appears to be well aligned with reality.[60] As a result of those settings, we obtain a divergence of equilibrium policy. Third, to investigate the effect of political misinformation, we incorporate a campaign competition stage, where political parties attempt to manipulate voters' perceptions of crime. The idea is similar to the model of campaign finance (Baron, 1994; Grossman and Helpman, 1996; Meirowitz, 2008) and the model of priming (Amorós and Puy, 2013; Aragonès et al., 2015; Egorov, 2015; Dragu and Fan, 2016; Denter, 2020). In the campaign stage, we show that the two parties attempt to change voters' perceptions in opposite directions.

Additionally, the current study has a similar motivation to the literature investigating the effect of fake news/misinformation in the political arena (Hochschild and Einstein, 2015; Allcott and Gentzkow, 2017; Guess et al., 2018; Grossman and Helpman, 2023). From a theoretical perspective, the current study can be seen as applying the model proposed by Grossman and

[59]Different from other law enforcement models with political competition, Mungan (2017) and Friehe and Mungan (2021) assume that the criminal benefit is stochastic and obtain an equilibrium similar to that of the probabilistic voting model.

[60]Historically, Republicans are considered to have ownership of the issue of criminality and focus on discussing crime reduction in terms of strengthening law enforcement (Petrocik, 1996; Petrocik et al., 2003).

Helpman (2023) to the law enforcement context. Grossman and Helpman (2023) develop a political competition model with imperfect information in which both parties can misinform voters and investigate when political behavior diverges. Unlike Grossman and Helpman (2023), we focus on the role of misinformation/information in law enforcement, especially to explain the cause of rising punitiveness. Furthermore, we explain the parties' incentive to manipulate voters' perceptions from a different perspective—issue ownership— and characterize the campaign competition between the parties.

Finally, strands of the literature investigate the cause of mass incarceration from historical and empirical perspectives (Barker, 2009; Campbell et al., 2015; Enns, 2014, 2016; Gottschalk, 2006, 2016; Jacobs and Jackson, 2010; Lacey et al., 2018). From a theoretical perspective, Mungan (2017) has a similar motivation to ours and investigates the cause of overincarceration from the perspective of disenfranchisement law. The current study investigates a similar question to that of Mungan (2017) from a different perspective—political misinformation/information.

The remainder of this chapter proceeds as follows. Section 4.2 explains the model and the behavior of each player. Section 4.3 shows the equilibrium of the game and explains how political misinformation affects the equilibrium law enforcement policy. Section 4.4 discusses the empirical implications of our model. Section 4.5 presents a conclusion and discusses directions for future research.

4.2 Model

Before presenting the details, we will provide an overview of the model. There are three types of players: political parties, voters, and criminals.

There are two political parties $P \in \{A, B\}$. In stage 1, they propose a law enforcement policy $p_P \in [0, 1]$, which states expected sanctions for criminals. One interpretation is that p is a probability of arrest, and the sanction is normalized to 1. In the following, we use the terms "law enforcement level" and "probability of arrest" interchangeably when referring to p. The parties' objective is to maximize the probability of winning. In stage 2, each candidate chooses the misinformation/information level and its direction regarding the perceived level of harm generated by crimes. The misinformation/information levels chosen by each party are represented as $\sigma_P \in [-\sigma, \sigma], \sigma > 0$. Uninformed voters are exposed to the party A's political campaign with fixed probability α and B's political campaign with probability $1 - \alpha$, where

$\alpha \in (0, 1)$.[61]

In stage 3, voters vote for the party that provides a higher utility. There are two types of voters: informed and uninformed voters. Informed voters have correct information about the harm of crime, and their beliefs are not affected by a political campaign. On the other hand, uninformed voters have a prior perception of crime with an upward bias over the actual value.[62] Additionally, their beliefs are malleable and affected by a political campaign.

In stage 4, the party that obtains more than half of the votes will win, and potential criminals choose whether they will commit a crime based on the implemented law enforcement policy.

The timing of the game can be summarized as follows.

- Stage 1: Political parties announce a law enforcement policy $p_P \in [0, 1]$.
- Stage 2: Political parties choose a misinformation/information level $\sigma_P \in [-\sigma, \sigma]$. Uninformed voters' perception of crimes is affected by A's political campaign with probability α and B's campaign with probability $1 - \alpha$.
- Stage 3: Voters vote for the party that provides a higher utility.
- Stage 4: The party that obtains half of the votes will win and implement the proposed policy. Potential criminals choose whether they will commit a crime under the implemented law enforcement.

The equilibrium concept is subgame perfect Nash equilibrium, and we focus on the pure strategy equilibrium. In the following subsections, we will explain each player's behavior in detail.

4.2.1 Criminals

There are potential criminals who consider whether to commit crime under the implemented law enforcement policy $p \in [0, 1]$. We assume that the number of potential criminals is normalized to $c \in [0, 1]$. Potential criminals are differentiated by their benefit from committing a crime b, and we assume that the benefit is uniformly distributed on $b \in [0, 1]$. The utility function of

[61] In Appendix F, we will explain that we can endogenize the probability by incorporating the campaign contest between political parties.

[62] This assumption is based on the fact that many voters believe that the crime situation has worsened despite the reality being the opposite, as we explained in the Introduction.

criminals when committing an offense is defined as $u_c = b - p$, where p is the probability of arrest or expected sanction cost. If potential criminals do not commit a crime, $u_c = 0$. Therefore, a potential criminal will commit a crime if and only if $u_c \geq 0 \Leftrightarrow b \geq p$. Since b is uniformly distributed on $[0, 1]$ and the number of potential criminals is c, the number of criminals who commit a crime under law enforcement level p can be calculated as $q = c(1 - p)$.

Note that it is not obvious that harsh law enforcement (i.e., an increased p) leads to an increase in incarceration. While an increase in p leads to criminals being arrested with high probability, it also discourages potential criminals from committing a crime. We require additional conditions to demonstrate that harsh law enforcement indeed leads to an increase in the incarceration rate. We will delve further into this matter in Section 4.3.5.

Additionally, unlike the combined law enforcement and political competition model proposed by Langlais and Obidzinski (2017), we assume that voters and criminals are different groups, i.e., potential criminals do not have voting rights.[63] The examples of potential criminals in this setting are disenfranchised ex-convicts, undocumented immigrants, and interregional criminals. [64]

4.2.2 Voters

There is a continuum of voters who are negatively affected by crimes. To simplify the following discussion, we assume that the pool of voters is normalized to one. The utility function of voters is written as

$$u = -\gamma(hq)^2 - t, \tag{4.1}$$

where $h > 0$ is the marginal harm caused by a crime, q is the number of potential criminals who commit a crime, and t is the tax burden. Then, hq can be interpreted as the total harm caused by criminals. $\gamma > 0$ is the weight of the disutility from crimes relative to the tax burden t,

[63] In the Langlais and Obidzinski (2017) model, people are both voters and potential criminals. Therefore, people choose the party while considering whether they will commit a crime under the expected law enforcement policy. This setting can address more general crimes, especially minor crimes. Examples are exceeding speed limits and littering.

[64] We could extend our model to include a setting where all voters are potential criminals, casting their ballots based on their criminal decisions using the stochastic crime decision model proposed by Mungan (2017) and Friehe and Mungan (2021). However, such an expansion would increase the complexity of our model, while the overall implications would remain unchanged. Considering that our primary focus in this study is the impact of political misinformation on law enforcement policy, we will maintain the simplicity of the current setting.

and we suppose that there is increasing marginal disutility of harm from crime, hq. t is the per capital tax burden and defined as $t = mp$, where $m > 0$ is a marginal monitoring cost for law enforcement policy.[65] Therefore, t can be interpreted as the tax burden to finance monitoring activities to prevent crimes. To efficiently mitigate the harm from crimes, voters demand the appropriate law enforcement level p. Although all voters have the same utility functional form, we will explain later that voters are differentiated by their idiosyncratic affinity for political parties.

Since the increasing marginal disutility of criminal harm is a crucial assumption for our results, we add some comments. The increasing marginal disutility assumption has a long tradition in Beckerian law enforcement models (Becker, 1968; Stigler, 1970). The assumption means that society (and individuals) will be more concerned with major crimes than minor crimes. For example, regarding crimes against property, the assumption means that the theft of \$1,000 is more than twice as harmful as the theft of \$500. This result is implied by the diminishing marginal utility of income (Stigler, 1970). The increasing marginal disutility assumption is also used in the immigration policy literature (Llavador and Solano-García, 2011). In this case, the assumption means that society believes that immigrants will generate social conflict, xenophobia, and insecurity, and the marginal negative social impact is assumed to be increasing in the number of immigrants.

By using the fact that $q = c(1-p)$ and $t = mp$, the utility function of voters can be rewritten as

$$u = -\gamma h^2 c^2 (1-p)^2 - mp. \tag{4.2}$$

Following models of political competition with imperfect information such as those of Baron (1994), Grossman and Helpman (1996, 2023), and Strömberg (2004), we assume that voters are divided into two categories: informed and uninformed voters. In this study, we suppose that informed voters have accurate information h and are not affected by parties' political campaigns regarding the severity of the harm from crime. On the other hand, uninformed voters have upward-biased prior beliefs about the crime situation. We denote the prior belief of an uninformed voter as $\tilde{h} = h + \Delta$, where $\Delta > 0$. This assumption is based on the fact that

[65] For simplicity, we assume that the monitoring cost is a linear function with respect to p. However, the main results remain unchanged if we use a convex cost function.

many voters hold a misconception about the crime situation, perceiving it to be worse than it actually is, as we explained in the Introduction. Furthermore, we suppose that their belief about the severity of harm from crime is malleable, i.e., their belief is affected by political parties' campaigns, which we will explain below. We assume that the ratio of informed to uninformed voters is fixed—the percentage of uninformed voters is $\lambda \in (0, 1)$, and that of informed voters is $1 - \lambda$.

4.2.3 Political parties

There are two political parties, $P \in \{A, B\}$. The parties are winning probability maximizers. In this model, we suppose that parties differ in their reputation/expertise in implementing law enforcement. Specifically, we assume that one party can implement policing activities with a more efficient cost and voters know this advantage. Without loss of generality, we suppose that party A has an advantage in policing activities and the marginal monitoring cost of A is smaller than B. In the following, we assume that $m_A < m_B$, where m_P represents the marginal monitoring cost if P wins the race and implements its law enforcement policy. In other words, this assumption means that party A has issue ownership of law enforcement (Petrocik, 1996; Petrocik et al., 2003). As we will explain below, the policy divergence is caused by the issue ownership assumption. If there is no policy divergence, parties do not have an incentive to manipulate voters' beliefs. Therefore, the assumption of issue ownership is crucial for our results.[66]

Note that in this study, we assume political competition with a one-dimensional policy space. However, the literature regarding issue ownership theory (Amorós and Puy, 2013; Aragonès et al., 2015; Egorov, 2015; Dragu and Fan, 2016; Denter, 2020) considers a multidimensional policy space and investigates how parties' issue ownership of different policies affects the incentives of political campaign spending and the electoral results. In Appendix E, we extend our model into a multidimensional setting and show that the main result of our model does not change under an additional condition.

Next, we will explain stage 2: parties' political campaigns. The main idea is similar to Grossman and Helpman (2023). In this model, we assume that uninformed voters' prior belief

[66] Grossman and Helpman (2023) elicits policy divergence through the use of a different assumption. In Section 4.3.4, we will delve into a comprehensive discussion of the differences between their model and ours and highlight the advantages of employing the issue ownership assumption.

on harm from crime $\tilde{h}$ is pliable and political parties can affect it through political campaigns. Specifically, we assume that parties can choose the exaggerated/correct level of harm by $\sigma_P \in [-\sigma, \sigma]$, and if voters are exposed to the campaign rhetoric of P, then their perceived harm from crime would change to $h_P = h + \Delta + \sigma_P$. To simplify the following discussion, we suppose that $\Delta > \sigma$ so that $h_P > h$ always holds (i.e., the perception of criminal harm cannot be below the actual value).[67] Note that the assumption of $\sigma_P \in [-\sigma, \sigma]$ means that the maximum degree of manipulation is symmetric in both exaggeration ($\sigma_P > 0$) and correction ($\sigma_P < 0$). Therefore, $\sigma > 0$ denotes the impact of misinformation/information, and a large σ means that the political parties' campaign has a larger effect on uninformed voters' perception of the harm from crime in both directions.

We assume that the probability of voters being exposed to party P's political campaign is exogenously determined. Specifically, we assume that voters are exposed to party A's political campaign with a probability of $\alpha \in (0, 1)$ and to party B's political campaign with a probability of $1 - \alpha$. One interpretation of α is the relative campaign budget of party A compared to party B. If party A has a larger campaign budget than party B, it can more effectively influence voters' beliefs, resulting in a higher probability of exposure to party A's campaign. In Appendix F, we demonstrate that the probability of exposure can be endogenized by incorporating the campaign contest between the two parties. We also show that even in this alternative setting, the main results of this study remain unchanged.

Then, the payoff function of political party P can be defined as

$$u_P = W_P(p_A, p_B, \sigma_A, \sigma_B), \tag{4.3}$$

where W_P is the winning probability of party P. Parties choose the direction of information σ_P to align with their platform.

As a final remark, we would like to discuss the interpretation of the political competition in our model. In this study, we consider a two-candidate presidential or congressional election. Within this interpretation, although political parties cannot directly implement law enforcement, we assume that candidates have the ability to influence the capacity for investigation, prosecu-

[67] This assumption allows us to interpret the results more intuitively since $-\sigma < 0$ always means correcting voters' beliefs, not understating the situation. However, this assumption does not affect the main message of our results.

tion, and incarceration through budgetary appropriations. Furthermore, candidates can impact incarceration rates by defining crime criteria and imposing sentencing requirements through federal or state laws. Under this framework, we simplify the discussion by abstracting from how law enforcement agencies react to political decision-making. However, several papers reveal that political pressure can affect the implemented law enforcement policy (Levitt, 1997; Huber and Gordon, 2004; Dyke, 2007; Berdejó and Yuchtman, 2013; McCannon, 2013; Bandyopadhyay and McCannon, 2014, 2015; Nadel et al., 2017). Therefore, the notion that the two-candidate presidential or congressional election and the proposed platforms influence actual law enforcement policy does not appear unrealistic.

On the other hand, another interpretation of the electoral competition in this model could be a two-candidate election for sheriff or district attorney. In fact, several empirical studies have investigated how elections for sheriff and district attorney affect law enforcement (Thompson, 2020; Krumholz, 2020; Okafor, 2021). However, despite the potential applicability of this interpretation, we will adopt the interpretation of a two-candidate presidential or congressional election. This is because we are focusing on the scenario where candidates influence voters' perceptions of crimes through political campaigns and discourse, which seems to align more closely with a two-candidate presidential or congressional election than an election for sheriff or district attorney.

4.3 Analysis

4.3.1 Law enforcement level that maximizes voters' utility

As a benchmark, we calculate the "utility-maximizing" law enforcement level in this subsection. Note first that optimal policy varies depending on the cost efficiency of each party. Intuitively, if A implements a policy, the optimal policy is determined given that the cost of policing crime is m_A. On the other hand, if B implements a policy, the optimal policy is determined given that the cost of policing crime is m_B. Therefore, the "utility-maximizing" law enforcement level depends on the party, and we denote it as $p^*_P, P \in \{A, B\}$.

Furthermore, there are two possibilities for the definition of a utility-maximizing policy: (i) calculating the policy that maximizes the voters' utility, including the uninformed voters' upward bias Δ, and (ii) calculating the policy that maximizes the voters' utility without the uninformed voters' upward bias Δ. We choose the former definition because this helps us to explore how political campaigns/misinformation cause positive or negative effects compared to the utility-maximizing policy. If we calculate the utility-maximizing policy without considering prior bias, it is unclear whether the difference between the utility-maximizing policy and equilibrium arises from the prior upward bias Δ or distortion caused by political misinformation.

Based on the definition, we obtain the following result by differentiating total utility with respect to p.

Proposition 4.1. The optimal law enforcement policy for voters, denoted as $p_P^* \in [0,1]$, is determined as follows: (i) If $\Omega^O \leq \frac{m_P}{2\gamma c^2}$, then $p_P^* = 0$. (ii) If $\Omega^O > \frac{m_P}{2\gamma c^2}$, then $p_P^* = \frac{\Omega^O - m_P/2\gamma c^2}{\Omega^O}$, where $\Omega^O = \lambda \tilde{h}^2 + (1-\lambda)h^2$.

In the proposition, Ω^O represents the squared value of the weighted average perception of criminal harm among voters. The superscript o means the original perception without being affected by a political campaign.

Proof. Note that the perception of criminal harm for uninformed voters is $\tilde{h} = h + \Delta$ while the perception for informed voters is h. Suppose that law enforcement policy p is implemented by party P. Then, the total utility with the prior biased beliefs of uninformed voters can be written as

$$U = \lambda[-\gamma\tilde{h}^2c^2(1-p)^2 - m_P p] + (1-\lambda)[-\gamma h^2c^2(1-p)^2 - m_P p]. \tag{4.4}$$

By differentiating U with respect to p, we have

$$\frac{\partial U}{\partial p} = \lambda[2\gamma\tilde{h}^2c^2 - 2\gamma\tilde{h}^2c^2p - m_P] + (1-\lambda)[2\gamma h^2c^2 - 2\gamma h^2c^2p - m_P]. \tag{4.5}$$

Since $\frac{\partial^2 U}{\partial p^2} = -\lambda(2\gamma\tilde{h}^2c^2) - (1-\lambda)(2\gamma h^2c^2) < 0$, a second-order condition is satisfied. If $\left.\frac{\partial U}{\partial p}\right|_{p=0} \leq 0$, then voters do not have an incentive to increase p. This condition can be written as

$$\begin{aligned}
&\lambda[2\gamma\tilde{h}^2c^2 - m_P] + (1-\lambda)[2\gamma h^2c^2 - m_P] \le 0\\
&\Leftrightarrow 2\gamma c^2[\lambda\tilde{h}^2 + (1-\lambda)h^2] \le m_P\\
&\Leftrightarrow \Omega^O \le \frac{m_P}{2\gamma c^2}. \qquad (4.6)
\end{aligned}$$

Then, we obtain (i). If $\Omega^O > \frac{m_P}{2\gamma c^2}$, p_P^* must satisfy the first-order condition. The first-order condition can be written as

$$\begin{aligned}
&\frac{\partial U}{\partial p} = \lambda[2\gamma\tilde{h}^2c^2 - 2\gamma\tilde{h}^2c^2p - m_P] + (1-\lambda)[2\gamma h^2c^2 - 2\gamma h^2c^2p - m_P] = 0\\
&\Leftrightarrow 2\gamma c^2\Omega^O - 2\gamma c^2p\Omega^O - m_P = 0\\
&\Leftrightarrow p_P^* = \frac{\Omega^O - m_P/2\gamma c^2}{\Omega^O}. \qquad (4.7)
\end{aligned}$$

$\square$

4.3.2 Probabilistic voting

Next, we consider voting behavior. As noted above, we use a probabilistic voting model such as those in Lindbeck and Weibull (1987) and Persson and Tabellini (2002). Suppose that A proposes p_A and B proposes p_B. Then, voter i votes for A if and only if

$$u(p_A, m_A, h) > u(p_B, m_B, h) + \eta_i, \qquad (4.8)$$

where η_i is an idiosyncratic affinity for party B and η_i is uniformly distributed on $[\eta - \frac{1}{2\psi}, \eta + \frac{1}{2\psi}]$. Voters have the same preference for law enforcement policy but are heterogeneous in their idiosyncratic affinities. For example, if $\eta_i < 0$, then voter i has an affinity for party A and vice versa. We suppose that parties know the distribution of η_i but do not know the actual value. Additionally, we assume that voters' idiosyncratic affinities are affected by aggregate uncertainty. Here, η denotes aggregate uncertainty, and we suppose that η is uniformly distributed on $[-\frac{1}{2\phi}, \frac{1}{2\phi}]$. One interpretation of aggregate uncertainty is that parties are uncertain about what type of event will happen after policy announcement and before voting. Examples are sudden changes in the economic state and political scandals, which may happen during elections and affect voters' affinities for political parties.

In the following discussion, we suppose that $m_A = \delta m < m = m_B$, where $0 < \delta < 1$. Therefore, δ represents a relative cost advantage of party A. Then, Equation (4.8) can be rewritten as

$$\begin{aligned} & -\gamma h^2 c^2 (1-p_A)^2 - \delta m p_A > -\gamma h^2 c^2 (1-p_B)^2 - m p_B + \eta_i \\ & \Leftrightarrow 2\gamma h^2 c^2 (p_A - p_B) - \gamma h^2 c^2 (p_A^2 - p_B^2) - m(\delta p_A - p_B) > \eta_i. \end{aligned} \tag{4.9}$$

Since η_i is uniformly distributed on $[\eta - \frac{1}{2\psi}, \eta + \frac{1}{2\psi}]$, the probability that voter i votes for A can be rewritten as[68]

$$\psi[2\gamma h^2 c^2 (p_A - p_B) - \gamma h^2 c^2 (p_A^2 - p_B^2) - m(\delta p_A - p_B) + \frac{1}{2\psi} - \eta]. \tag{4.10}$$

Since uninformed voters' perception of the harm from crime can be affected by political campaigns, these voters' perceptions might differ from the actual value h. As explained above, we denote the uninformed voters' perceived harm from crime by h_P if they are exposed to party P's political campaign. Note that uninformed voters are exposed to party A's campaign with probability α and party B's campaign with probability $1-\alpha$. Furthermore, note that the proportion of uninformed voters is λ and that of informed voters is $1-\lambda$. Then, the expected total vote share for party A can be calculated as

$$\begin{aligned} & \underbrace{(1-\lambda)\psi[2\gamma h^2 c^2 (p_A - p_B) - \gamma h^2 c^2 (p_A^2 - p_B^2) - m(\delta p_A - p_B) + \frac{1}{2\psi} - \eta]}_{\text{informed voters}} \\ & \quad + \underbrace{\lambda\alpha\psi[2\gamma h_A^2 c^2 (p_A - p_B) - \gamma h_A^2 c^2 (p_A^2 - p_B^2) - m(\delta p_A - p_B) + \frac{1}{2\psi} - \eta]}_{\text{uninformed voters exposed to } A\text{'s campaign}} \\ & \quad + \underbrace{\lambda(1-\alpha)\psi[2\gamma h_B^2 c^2 (p_A - p_B) - \gamma h_B^2 c^2 (p_A^2 - p_B^2) - m(\delta p_A - p_B) + \frac{1}{2\psi} - \eta]}_{\text{uninformed voters exposed to } B\text{'s campaign}}. \end{aligned} \tag{4.11}$$

[68] To calculate the probability, we suppose that ψ is sufficiently small.

If the total vote share is larger than one-half, party A will win the race. Therefore, the probability of winning for party A can be defined as

$$\begin{aligned} W_A = Prob\{&(1-\lambda)\psi[2\gamma h^2c^2(p_A - p_B) - \gamma h^2c^2(p_A^2 - p_B^2) - m(\delta p_A - p_B) + \frac{1}{2\psi} - \eta] \\ &+ \lambda\alpha\psi[2\gamma h_A^2c^2(p_A - p_B) - \gamma h_A^2c^2(p_A^2 - p_B^2) - m(\delta p_A - p_B) + \frac{1}{2\psi} - \eta] \\ &+ \lambda(1-\alpha)\psi[2\gamma h_B^2c^2(p_A - p_B) - \gamma h_B^2c^2(p_A^2 - p_B^2) - m(\delta p_A - p_B) + \frac{1}{2\psi} - \eta] > \frac{1}{2}\}. \end{aligned} \tag{4.12}$$

Since η is uniformly distributed on $[-\frac{1}{2\phi}, \frac{1}{2\phi}]$, the winning probability of A can be calculated as[69]

$$\begin{aligned} W_A = &(1-\lambda)\phi[2\gamma h^2c^2(p_A - p_B) - \gamma h^2c^2(p_A^2 - p_B^2) - m(\delta p_A - p_B) + \frac{1}{2\phi}] \\ &+ \lambda\alpha\phi[2\gamma h_A^2c^2(p_A - p_B) - \gamma h_A^2c^2(p_A^2 - p_B^2) - m(\delta p_A - p_B) + \frac{1}{2\phi}] \\ &+ \lambda(1-\alpha)\phi[2\gamma h_B^2c^2(p_A - p_B) - \gamma h_B^2c^2(p_A^2 - p_B^2) - m(\delta p_A - p_B) + \frac{1}{2\phi}]. \end{aligned} \tag{4.13}$$

Following the same logic, the winning probability of B can be written as

$$\begin{aligned} W_B = &(1-\lambda)\phi[\frac{1}{2\phi} - 2\gamma h^2c^2(p_A - p_B) + \gamma h^2c^2(p_A^2 - p_B^2) + m(\delta p_A - p_B)] \\ &+ \lambda\alpha\phi[\frac{1}{2\phi} - 2\gamma h_A^2c^2(p_A - p_B) + \gamma h_A^2c^2(p_A^2 - p_B^2) + m(\delta p_A - p_B)] \\ &+ \lambda(1-\alpha)\phi[\frac{1}{2\phi} - 2\gamma h_B^2c^2(p_A - p_B) + \gamma h_B^2c^2(p_A^2 - p_B^2) + m(\delta p_A - p_B)]. \end{aligned} \tag{4.14}$$

4.3.3 Equilibrium in campaign contest

Next, we will show the subgame perfect Nash equilibrium of this game by using backward induction. Since we already analyzed stage 4 (criminal behavior) and stage 3 (voting behavior) in the previous subsections, we will begin the analysis from stage 2 . In stage 2, each political party chooses the direction of misinformation/information σ_P. In the following discussion, we

[69] To calculate the probability, we suppose that ϕ is sufficiently small.

assume preliminarily that $p_A > p_B$ holds in equilibrium. In the later analysis, we will show that this must be true in equilibrium. Intuitively, the divergence of law enforcement policy stems from the fact that party A has a cost advantage in policing activities and can propose a higher law enforcement level p than party B. The result can be summarized as follows.

Proposition 4.2. In equilibrium of stage 2, party A proposes $\sigma_A = \sigma$ and B proposes $\sigma_B = -\sigma$.

Proof. Note that $h_A = \tilde{h} + \sigma_A$ and $\sigma_A \in [-\sigma, \sigma]$. By differentiating W_A with respect to h_A, we have

$$\frac{\partial W_A}{\partial h_A} = \lambda\alpha\phi[4\gamma h_A c^2(p_A - p_B) - 2\gamma h_A c^2(p_A^2 - p_B^2)]. \tag{4.15}$$

$\frac{\partial W_A}{\partial h_A}$ must be positive because

$$\begin{aligned} 4\gamma h_A c^2(p_A - p_B) - 2\gamma h_A c^2(p_A^2 - p_B^2) > 0 \\ \Leftrightarrow 2 > p_A + p_B. \end{aligned} \tag{4.16}$$

Since $\frac{\partial W_A}{\partial h_A} > 0$ holds, party A has an incentive to increase h_A, and $\sigma_A = \sigma$ holds. The same logic can be applied to party B, and $\sigma_B = -\sigma$ holds.

□

Before proceeding to the next step, we would like to emphasize that the underlying mechanism driving this result shares similarities with the fundamental findings of studies that investigate the manipulation of issue salience in political campaigns (Amorós and Puy, 2013; Aragonès et al., 2015; Egorov, 2015; Dragu and Fan, 2016; Denter, 2020). According to these papers, a party that possesses issue ownership in a particular area is interested in amplifying that issue's salience (i.e., the weight of importance) through political campaigning. In our model, instead of directly manipulating the weight of interest in a specific issue, political parties manipulate the perception of criminal harm. When voters perceive criminal harm to be substantial, they believe that addressing crime becomes more crucial. Conversely, if voters perceive criminal harm as less significant than anticipated, they assign greater importance to another political issue. Consequently, if party A holds a greater advantage in addressing crime, it is incentivized to exaggerate the severity of harm (i.e., increase the salience of this issue). Conversely, party B has the incentive to downplay crime harm to divert voters' interest away from addressing crime.

However, one may question how issue ownership can be modeled without considering multiple dimensions, as several theory papers that discuss issue competition (Amorós and Puy, 2013; Aragonès et al., 2015; Egorov, 2015; Dragu and Fan, 2016; Denter, 2020) adopt multidimensional policies. For instance, in those papers, one party possesses issue ownership in a specific policy area, while the other party has ownership in a different policy area. On the other hand, in our model, issue competition works within a one-dimensional context as follows: party A is incentivized to exaggerate the severity of crime, thereby increasing the salience of the crime issue, over which they have issue ownership. Conversely, party B is motivated to understate/correct voters' beliefs, decreasing the salience of the crime issue, where it lacks an advantage. Consequently, party B's campaign makes voters base their ballot choices more on their idiosyncratic affinity η_i than on law enforcement policy, thereby increasing the winning probability of party B.

To ensure the robustness of our findings, we will also demonstrate in Appendix E that our results remain unchanged even if we expand our model to incorporate a multidimensional context.

4.3.4 Equilibrium in political competition

Next, we will investigate the equilibrium in stage 1. The winning probability of A can be written as

$$\begin{aligned}
W_A = (1-\lambda)\phi[2\gamma h^2c^2(p_A-p_B) - \gamma h^2c^2(p_A^2-p_B^2) - m(\delta p_A - p_B) + \frac{1}{2\phi}] \\
+ \lambda\alpha\phi[2\gamma h_A^2c^2(p_A-p_B) - \gamma h_A^2c^2(p_A^2-p_B^2) - m(\delta p_A - p_B) + \frac{1}{2\phi}] \\
+ \lambda(1-\alpha)\phi[2\gamma h_B^2c^2(p_A-p_B) - \gamma h_B^2c^2(p_A^2-p_B^2) - m(\delta p_A - p_B) + \frac{1}{2\phi}] \\
= \phi[2\gamma c^2\Omega(p_A-p_B) - \gamma c^2\Omega(p_A^2-p_B^2) - m(\delta p_A - p_B) + \frac{1}{2\phi}],
\end{aligned} \tag{4.17}$$

where Ω is defined as

$$\Omega = \underbrace{\lambda[\alpha(\tilde{h}+\sigma)^2 + (1-\alpha)(\tilde{h}-\sigma)^2]}_{\text{(square of) uninformed voters' perception of harm}} + \underbrace{(1-\lambda)h^2.}_{\text{(square of) informed voters' perception of harm}} \tag{4.18}$$

Note that $\tilde{h}+\sigma$ represents the perception of criminal harm for voters exposed to A's campaign, $\tilde{h}-\sigma$ represents the perception of criminal harm for voters exposed to B's campaign, and h represents the perception of criminal harm for informed voters. Therefore, Ω corresponds to the squared value of the weighted average perceptions of criminal harm. By differentiating (4.17) with respect to p and combining this with the results in the previous subsections, we obtain the subgame perfect Nash equilibrium of the model.

Proposition 4.3. In a political competition (stage 1), party $P \in \{A, B\}$ proposes the following platform: (i) if $\Omega \leq \frac{m_P}{2\gamma c^2}$, then $p_P = 0$. (ii) if $\Omega > \frac{m_P}{2\gamma c^2}$, then $p_P = \frac{\Omega - m_P/2\gamma c^2}{\Omega}$. In stage 2, party A proposes $\sigma_A = \sigma$ and B proposes $\sigma_B = -\sigma$.

Since $m_A = \delta m < m = m_B$, if $\Omega > \delta m/2\gamma c^2$, $p_A > p_B$ holds. In other words, the party with issue ownership (party A) proposes a harsher law enforcement policy than the party that does not have an advantage (party B). In the campaign contest (stage 2), the party that has issue ownership (party A) attempts to overstate the seriousness of the harm from crime, and the party that does not have issue ownership (party B) attempts to correct voters' belief.

Proof. Let us consider the case of party A. By differentiating the winning probability with respect to p_A, we have

$$\frac{\partial W_A}{\partial p_A} = \phi[2\gamma c^2\Omega - 2\gamma c^2\Omega p_A - \delta m]. \tag{4.19}$$

Then, if $\left.\frac{\partial W_A}{\partial p_A}\right|_{p_A=0} \leq 0$, the party has no incentive to increase p_A. This condition can be written as $\phi[2\gamma c^2\Omega - \delta m] \leq 0 \Leftrightarrow \Omega \leq \delta m/2\gamma c^2$, so we obtain (i).

Next, let us consider case (ii). Since $\frac{\partial^2 W_A}{\partial p_A^2} = -2\phi\gamma c^2\Omega < 0$, the second-order condition is satisfied. By the first-order condition, we obtain

$$\frac{\partial W_A}{\partial p_A} = \phi[2\gamma c^2\Omega - 2\gamma c^2\Omega p_A - \delta m] = 0$$
$$\Leftrightarrow p_A = \frac{\Omega - \delta m/2\gamma c^2}{\Omega}. \tag{4.20}$$

Following the same logic, if $\Omega \leq m/2\gamma c^2$, then $p_B = 0$. Moreover, if $\Omega > m/2\gamma c^2$, then p_B can be calculated as

$$\frac{\partial W_B}{\partial p_B} = \phi[2\gamma c^2\Omega - 2\gamma c^2\Omega p_B - m] = 0$$
$$\Leftrightarrow p_B = \frac{\Omega - m/2\gamma c^2}{\Omega}. \tag{4.21}$$

Since $0 < \delta < 1$, $p_A > p_B$ holds if $\Omega > \delta m/2\gamma c^2$. □

Before discussing the implications of this result, we would like to discuss the difference between Grossman and Helpman (2023) (hereafter GH) and our findings. GH also discovers policy divergence along with misinformation without assuming issue ownership. In GH, policy divergence arises from the interaction between sequential moves of political parties and the characteristics of misinformation, where parties can announce false states of the world to uninformed voters. Specifically, in GH, the incumbent proposes the platform first, followed by the challenger. Then, if the challenger has an advantage in influencing uninformed voters' beliefs, they are motivated to shift their policy position away from the incumbent. Due to the challenger's greater impact on uninformed voters, it announces a policy opposite to the incumbent's and promotes a false state of the world aligned with its policy, seeking to divert votes from the incumbent. This setting allows policy divergence without issue ownership, but it does not have a pure-strategy equilibrium when parties simultaneously announce their policies.

In contrast to GH, our model introduces policy divergence through issue ownership. One party always proposes a higher probability of arrest (harsh law enforcement) due to its cost advantage in policing crimes. This policy divergence leads to the polarization of political misinformation, similar to GH. Our model offers two advantages over GH. First, policy divergence and the polarization of political misinformation occur even without the assumption of sequential policy proposals as in GH. Second, our model makes an empirical prediction regarding which party has an incentive to overstate/understate the state of the world (e.g., severity of criminal harm) during a political campaign, which is not evident in GH (see Proposition 3 in GH).

4.3.5 The effect of political misinformation/information

Next, we investigate the impact of political misinformation/information on the equilibrium platforms. By differentiating p_A and p_B with respect to σ, we have

$$\frac{\partial p_A}{\partial \sigma} = \frac{\partial \Omega/\partial \sigma \cdot \Omega - (\Omega - \delta m/2\gamma c^2) \cdot \partial \Omega/\partial \sigma}{\Omega^2} = \frac{\delta m/2\gamma c^2}{\Omega^2}\frac{\partial \Omega}{\partial \sigma}. \tag{4.22}$$

$$\frac{\partial p_B}{\partial \sigma} = \frac{\partial \Omega/\partial \sigma \cdot \Omega - (\Omega - m/2\gamma c^2) \cdot \partial \Omega/\partial \sigma}{\Omega^2} = \frac{m/2\gamma c^2}{\Omega^2}\frac{\partial \Omega}{\partial \sigma}. \tag{4.23}$$

Therefore, $sign(\frac{\partial p_A}{\partial \sigma}) = sign(\frac{\partial p_B}{\partial \sigma}) = sign(\frac{\partial \Omega}{\partial \sigma})$ holds. Then, if $\frac{\partial \Omega}{\partial \sigma} > 0$, the political campaign will make both parties' proposals harsher. The conditions can be calculated as follows:

$$\begin{aligned}\frac{\partial \Omega}{\partial \sigma} > 0 &\Leftrightarrow \lambda[2\sigma + 2\tilde{h}(2\alpha - 1)] > 0 \\ &\Leftrightarrow \alpha > \frac{1}{2} - \frac{\sigma}{2\tilde{h}}.\end{aligned} \tag{4.24}$$

This condition means that both parties are more likely to propose a harsher policy as a result of the political campaign, even if the relative political campaign effectiveness of A is low, i.e., $\alpha < \frac{1}{2}$. In other words, the effect of misinformation by party A is more likely to exceed the impact of correction by B even if A has a disadvantage in campaign effectiveness (α). As a result, the total effect of the political campaign is more likely to lead to harsher law enforcement despite that the two parties misinform/inform about the crime situation in opposite directions and to the same degree (σ). The result can be summarized as follows.

Proposition 4.4. Suppose that $\alpha > \frac{1}{2} - \frac{\sigma}{2\tilde{h}}$ holds. Then, the political campaign will change both parties' law enforcement policy in a harsher direction.

The mechanism behind this result stems from the combination of the probabilistic voting model and the assumption of voters' increasing marginal disutility concerning the harm caused by crime, a standard assumption in the law and economics literature, as explained in Section 4.2.2.

To illustrate this, consider a simple example. Suppose that there are only uninformed voters, and half of them are exposed to party A's political campaign (referred to as group A), while the other half are exposed to party B's political campaign (referred to as group B). Both parties can manipulate the uninformed voters' beliefs about the harm from crime by $\sigma > 0$. Consequently, voters in group A believe that the harm is $\tilde{h} + \sigma$, while voters in group B believe that the harm is $\tilde{h} - \sigma$. One might intuitively expect that this would cancel out the effect of information manipulation since each group of voters believes the harm is higher/lower by the same amount σ. However, this is not the case.

In a probabilistic voting model, political parties respond to the average voter's utility. In this simplified scenario, the average voter's utility can be calculated as:

$$\underbrace{\frac{1}{2}[-\gamma(\tilde{h}+\sigma)^2q^2 - t]}_{\text{group A}} + \underbrace{\frac{1}{2}[-\gamma(\tilde{h}-\sigma)^2q^2 - t]}_{\text{group B}}. \tag{4.25}$$

Note that to the extent that p remains unchanged, political misinformation/information does not impact the number of criminals, denoted by $q = c(1-p)$, since potential criminals' decision-making is unaffected by the harm from crime. In other words, voters believe that potential criminals do not care about the harm caused by crime when choosing to violate a law. Consequently, the tax burden $t = mp$ also remains unchanged due to political misinformation/information as long as p remains unchanged. Thus, we can observe that political campaigns exacerbate the average voter's disutility due to the increasing marginal disutility assumption:

$$\begin{aligned} &\frac{1}{2}[-\gamma(\tilde{h}+\sigma)^2q^2 - t] + \frac{1}{2}[-\gamma(\tilde{h}-\sigma)^2q^2 - t] \\ \Leftrightarrow &-\gamma\tilde{h}^2q^2 - t \quad \underbrace{-\gamma\sigma^2q^2}_{\text{campaign effect}} \quad . \end{aligned} \tag{4.26}$$

The first term represents the average voter's utility without political campaigns, while the second term represents the campaign effect. As political campaigns exacerbate the average voter's utility, he or she demand harsh law enforcement (p).

In this simple example, we assume that exactly half of the uninformed voters are exposed to

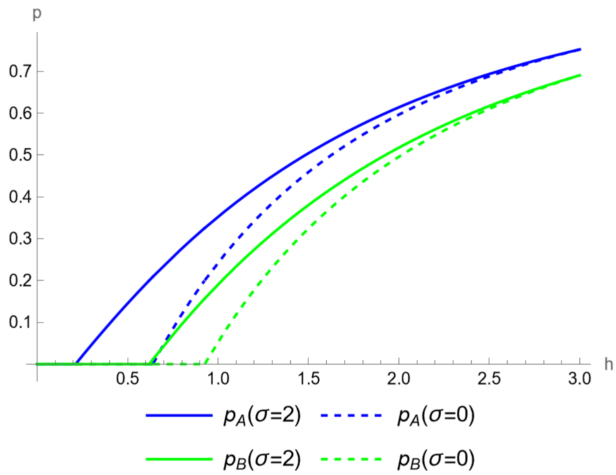


Figure 4.1: The effect of misinformation on the equilibrium platforms

Notes: In this graph, we set $\alpha = 0.4, \lambda = 0.7, \delta = 0.8, m = 0.5, \gamma = 1, c = 0.2, \Delta = 2$.

each party's political campaign. However, as long as the number of uninformed voters exposed to party B's campaign is not significantly larger than that of party A, the misinformation effect of party A still outweighs the information effect of party B.

Figure 4.1 shows how political misinformation/information affects the equilibrium platform. Here, we set $\alpha = 0.4$, meaning that party B (i.e., the party that attempts to understate/correct the severity of criminal harm) affects uninformed voters' perception with a higher probability. The solid lines show the equilibrium platforms when $\sigma = 2$ (with political misinformation), and the dotted lines show the equilibrium platforms when $\sigma = 0$ (without political misinformation). Since $\alpha > \frac{1}{2} - \frac{\sigma}{2\tilde{h}}$ holds under those parameters, the political campaign leads to harsh law enforcement. The interesting point is that although the two parties' campaign directions are the opposite (overstate/correct) and the impact is the same (σ), the total effect of a political campaign makes both parties' law enforcement policies harsher. The mechanism behind this phenomenon is simple. In equilibrium, the voters exposed to A's campaign demand harsher law enforcement, and those exposed to B's campaign demand a more lenient policy. However, since the marginal disutility from crime increases at an increasing rate, the effect of overstatement is more significant than that of correction. As a result, the average voter demands harsher policy despite that the two parties attempt to change voters' beliefs in opposite directions.

Figure 4.2 shows how the distortion of law enforcement happens depending on the misinformation/information level σ. In this figure, we compare the proposed law enforcement policy p_P

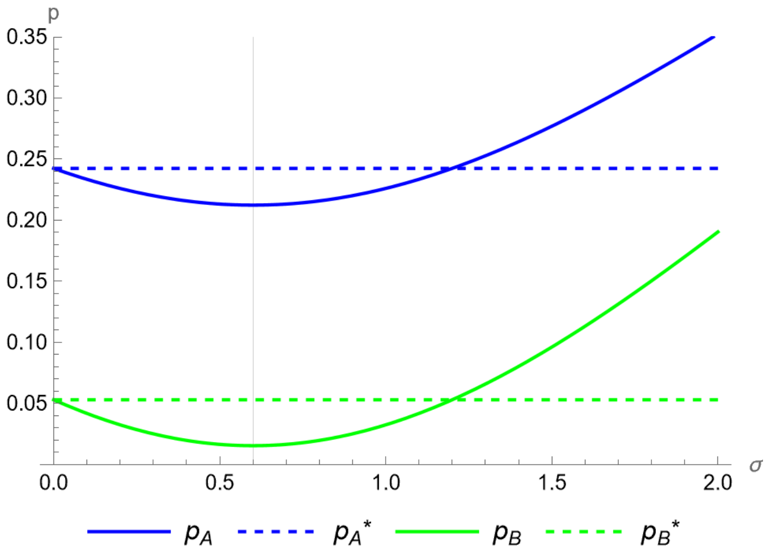


Figure 4.2: Utility-maximizing policy and equilibrium platform

Notes: In this graph, we set $\alpha = 0.4, \lambda = 0.7, \delta = 0.8, m = 0.5, \gamma = 1, c = 0.2, \Delta = 2, h = 1$.

and utility-maximizing policy p_P^*.

We would like to highlight three points. First, if $\sigma = 0$, $p_P = p_P^*$ holds, meaning that when there is no political misinformation/information, both parties propose the policy that maximizes utility. This is evident from the definitions of p_P and p_P^*. According to Proposition 4.1, the utility-maximizing law enforcement policy implemented by party P can be expressed as:

$$p_P^* = \frac{\Omega^O - m_P/2\gamma c^2}{\Omega^O}. \tag{4.27}$$

On the other hand, according to Proposition 4.3, p_P can be calculated as:

$$p_P = \frac{\Omega - m_P/2\gamma c^2}{\Omega}. \tag{4.28}$$

It is clear that by definition, if $\sigma = 0$, then $\Omega = \Omega^O$. Therefore, if $\sigma = 0$, then $p_P = p_P^*$.

Second, if σ is sufficiently small such that $\alpha < \frac{1}{2} - \frac{\sigma}{2\tilde{h}}$, political misinformation leads to lenient law enforcement, which falls below the utility-maximizing level. It is important to recognize that this only occurs when party B holds a relative advantage in campaign effectiveness since $\alpha < \frac{1}{2} - \frac{\sigma}{2\tilde{h}}$ holds only when $\alpha < 1/2$. Intuitively, this implies that the political campaign of party B (understating/correcting the severity of criminal harm) outweighs that of party A only when uninformed voters are more likely to be exposed to the information provided by B and the level of misinformation σ is not substantial.

Third, and most important, if σ becomes large enough and $\alpha > \frac{1}{2} - \frac{\sigma}{2h}$ holds, the impact of party A's political campaign (overstating the severity of crimes) surpasses that of correcting voters' beliefs. Consequently, the average voter begins to demand harsh law enforcement policies. As a result, if σ becomes large enough, p_P exceeds the utility-maximizing level. This example demonstrates that even when party B can manipulate uninformed voters' beliefs with higher probability and attempts to correct voters' beliefs, an increase in the level of misinformation/information (σ) enables party A to misinform voters more intensely, leading to harsh law enforcement. In other words, if voters' beliefs are malleable and politicians possess the means to manipulate them, it can be challenging to avoid excessive law enforcement.

Finally, we would like to discuss the condition that harsh law enforcement will increase the incarceration rate. An increase in the probability of arrest, denoted by p, leads to more apprehension of individuals who have violated the law. However, this increase in p also acts as a deterrent, discouraging potential criminals from attempting crimes. Therefore, an increase in p does not necessarily result in a corresponding increase in the incarceration rate.

Let us define the incarceration rate in our model. Note that the number of potential criminals violating the law is q, and they are arrested with a probability of p. Therefore, the number of arrested criminals is calculated as qp. If the potential criminal's benefit from committing a crime, denoted as b, is higher than the expected cost, i.e., $b - p \geq 0$, he or she would violate the law. Since b is uniformly distributed on $[0, 1]$, in equilibrium, $q = c(1 - p)$ holds.

Since the total population is $1 + c$, the incarceration rate of the society is calculated as $\frac{qp}{1+c} = \frac{c(1-p)p}{1+c}$. Note that in this definition, the effect of increasing p depends on its level: an increase in the probability of arrest leads to the apprehension of individuals who have violated the law, but it also acts as a deterrent, discouraging potential criminals from attempting crimes. By differentiating the incarceration rate with respect to p, we obtain:

$$\begin{aligned}\frac{\partial(\frac{qp}{1+c})}{\partial p} > 0 &\Leftrightarrow \frac{c - 2cp}{1 + c} > 0 \\ &\Leftrightarrow \frac{1}{2} > p. \qquad (4.29)\end{aligned}$$

Based on the above, we obtain the following corollary:

Corollary 4.1. Suppose that $\alpha > \frac{1}{2} - \frac{\sigma}{2\tilde{h}}$. Then, a political campaign will lead to changes in both parties' law enforcement policies toward harsher measures, resulting in an increase in the incarceration rate as long as $p_P < \frac{1}{2}$ holds.

In equilibrium, for example, when the marginal cost of law enforcement m_P is large, we have $p_P < \frac{1}{2}$.

Although the actual probability of arrest varies depending on the type of crime, it does not appear to be as high as one might think. For instance, in the U.S. in 2018, Baughman (2020) estimated the true arrest rates (known crimes compared to the arrest rates for those crimes): 80.95 percent for murder, 37.41 percent for aggravated assault, 15.38 percent for robbery, and 6.77 percent for burglary.

Furthermore, Baughman (2020) demonstrates that the overall true arrest rate in the U.S. in 2018 was 10.57 percent, which is lower than expected. Additionally, the conviction rate would be lower than the arrest rate since not all arrests result in conviction (Baughman, 2020).

Corollary 1 states that the impact of harsh law enforcement on the incarceration rate varies depending on the type of crime and its arrest/conviction rates. However, it seems reasonable to argue that harsh law enforcement leads to higher total incarceration rates because the probability of arrest does not appear to be very high for most crimes and satisfies the condition of Corollary 1.[70]

4.3.6 Other comparative statics

Finally, we summarize how other parameters affect the equilibrium platforms. First, the proportion of uninformed voters λ increases the equilibrium law enforcement level p_A, p_B. This can be checked as follows. Note that $sign(\frac{\partial p_A}{\partial \lambda}) = sign(\frac{\partial p_B}{\partial \lambda}) = sign(\frac{\partial \Omega}{\partial \lambda})$. Then, we have

$$\begin{aligned} \frac{\partial \Omega}{\partial \lambda} &= \tilde{h}^2 + \sigma^2 + 2\sigma\tilde{h}(2\alpha - 1) - h^2 > 0 \\ &\Leftrightarrow (\tilde{h} - \sigma)^2 + 4\sigma\tilde{h}\alpha - h^2 > 0. \end{aligned} \tag{4.30}$$

[70]For further evidence, the Federal Bureau of Investigation (FBI) reports that the clearance rates (crimes reported to the police that result in the arrest of a suspect turned over for prosecution) were 45.5 percent for violent crimes and 17.2 percent for property crimes in 2019. See `https://ucr.fbi.gov/crime-in-the-u.s/2019/crime-in-the-u.s.-2019/topic-pages/clearances`.

This is true because $\tilde{h}-\sigma > h$ holds by definition. As we explained in Proposition 4.3, uninformed voters' perception is affected by a political campaign, and the total effect makes equilibrium platforms harsher. Therefore, the result that having more uninformed voters leads to harsh law enforcement is straightforward.

Second, the size of the potential criminal group c is positively related to the law enforcement level, i.e., $\frac{\partial p_A}{\partial c} > 0$, and $\frac{\partial p_B}{\partial c} > 0$, which is evident by the definition of equilibrium policies. The interpretation is also straightforward because the size of the population of potential criminals directly increases external harm for voters, so they demand harsher law enforcement policy.

Third, if $\alpha > \frac{1}{2} - \frac{\sigma}{2\tilde{h}}$ (i.e., political campaigns lead to harsh enforcement), increases in σ lead to convergence between the political parties' platforms, i.e., $\frac{\partial p_B}{\partial \sigma} > \frac{\partial p_A}{\partial \sigma}$. This can be checked as follows: by differentiating p_A and p_B with respect to σ, we have

$$\frac{\partial p_A}{\partial \sigma} = \frac{\delta m/2\gamma c^2}{\Omega^2}\frac{\partial \Omega}{\partial \sigma}, \quad \frac{\partial p_B}{\partial \sigma} = \frac{m/2\gamma c^2}{\Omega^2}\frac{\partial \Omega}{\partial \sigma}. \tag{4.31}$$

If $\alpha > \frac{1}{2} - \frac{\sigma}{2\tilde{h}}$, we have $\frac{\partial \Omega}{\partial \sigma} > 0$. Additionally, since $0 < \delta < 1$ holds, we have $\frac{\partial p_B}{\partial \sigma} > \frac{\partial p_A}{\partial \sigma}$. Similarly, the proportion of uninformed voters λ also leads to convergence between the political parties' platforms, i.e., $\frac{\partial p_B}{\partial \lambda} > \frac{\partial p_A}{\partial \lambda}$ following the same calculation. The interpretation is as follows: As noted above, an increase in σ and λ leads voters to demand harsher policy because they believe that the crime situation is severe. However, since the marginal detection effect of p is decreasing, the gap between p_A (higher platform) and p_B (lower platform) would shrink.

4.4 Empirical implications

In this section, we would like to discuss the empirical implications of our model by referring to empirical research on the related topics.

First, our model predicts that a political party with issue ownership on policing crime has an incentive to overstate the situation to align with its advantage. This appears to be an intuitive argument—if voters believe that the crime situation is dire, they will be more inclined to depend on the party that has competence in handling the situation. Therefore, if voters' beliefs and perceptions are malleable, the party with issue ownership has a strong incentive to incite voters' punitive attitudes toward crime. Although it is not stable (Holian, 2004), the conventional view is that Republicans have issue ownership of policing crime in the United States (Petrocik, 1996; Petrocik et al., 2003). Thus, Republican presidents often seem to overstate the crime situation. The most extreme example may be the false arguments advanced by Donald Trump. For example, in 2016, Donald Trump claimed that "the US murder rate was the highest it's been in 45 to 47 years", but this was not true.[71] Although potentially not as extremely as in this example, politicians may mislead voters' perceptions of crime by emphasizing the agenda even when the crime rate is decreasing. For example, Republican presidents are often said to incite the voters' punitive attitude by combining law-and-order appeals with racial problems (Mendelberg, 2001; Weaver, 2007; Jacobs and Jackson, 2010). However, this is anecdotal evidence. A more serious empirical investigation is needed to check the plausibility of the hypothesis.

Second, our model predicts that issue ownership leads to divergence in law enforcement policy. Specifically, our model predicts that the party with a reputation for handling crime tends to propose harsher law enforcement than the other party. Several studies have examined the relationship between harsh law enforcement and the partisan effects of political parties. For instance, Gerber and Hopkins (2011) reports that cities electing Democratic mayors allocate a smaller proportion of their budget to public safety, an area with significant local discretion, than cities with similar characteristics electing Republican or independent mayors. Furthermore, several studies show that policy divergence may exist even in the election of district attorneys. For example, Krumholz (2020) demonstrates that the election of a Republican district attorney, as opposed to a Democratic district attorney, resulted in a 6-8 percent increase in total sentenced months and new prison admissions per capita during the four years following an election where a majority of district attorneys ran unopposed. Additionally, Okafor (2021) finds that being in a district attorney election year contributed to higher total prison admissions per capita and total months sentenced per capita, with larger effects observed in Republican counties. On the other hand, there is also research that presents different viewpoints. For example, Thompson (2020) investigates elections for sheriffs and demonstrates that Democratic and Republican law enforcers make similar choices regarding immigration enforcement. Therefore, further empirical investigations are necessary to comprehensively understand situations where partisan differences arise in law enforcement.

Third, our model predicts that political discourse regarding the crime situation leads to harsh

[71] See "Trump: the murder rate is at a 45-year high. Actual statistics: that's not remotely true" on Vox (`https://www.vox.com/2016/10/12/13255466/trump-murder-rate`).

enforcement, even when the same amount of effort is devoted to correcting voters' perceptions as to misinforming them. There is some evidence that political discourse may lead to misperceptions by citizens. For example, using a survey on the U.S. Social Security program, Jerit and Barabas (2006) show that citizens mistakenly believe that Social Security will run out of money because politicians frequently refer to pessimistic assessments of its financial future. Esberg and Mummolo (2018) demonstrate that elite partisan cues enhance citizen misperceptions of crime and diminish confidence in the official data. On the other hand, there is some empirical research that investigates the effect of corrective information. Larsen and Olsen (2020) report that if citizens are continually supplied with correct information about burglary rates, this can reduce the misperception of the prevalence of burglaries. On the other hand, Nyhan and Reifler (2010) show that corrective information sometimes fails to reduce misperceptions about politics, especially when people are ideologically biased. However, to the best of our knowledge, the aggregate effect of political misinformation/information about crime situations remains unclear. To assess the plausibility of our prediction, more rigorous empirical research is needed.

Finally, our model predicts that it is challenging to avoid harsh law enforcement to the extent that voters' beliefs about the crime situation are pliable. If this prediction is correct, our results may suggest the importance of improving voters' prior knowledge of the facts. As Esberg and Mummolo (2018) show, if people have sufficient knowledge of the facts, political discourse is less likely to manipulate their beliefs. However, if they do not, it is difficult to avoid the distortion of law enforcement policy. In the current study, this corresponds to a decrease in the percentage of uninformed voters λ.

4.5 Conclusion

This study provides a formal framework to explain why law enforcement policies have become harsher despite that the crime situation has improved for decades. Our model provides the following explanation: in political competition regarding the issue of criminality, the party that has an advantage in policing crime has the incentive to overstate the severity of crime, and the other party has the incentive to correct voters' beliefs. This political misinformation/information makes some voters believe that the crime situation is worse than reality, while other voters' belief approaches reality. However, voters' punitive attitudes are more likely to be incited rather than appeased; the former outweighs the latter effect, leading the average voter to demand harsher law enforcement.

There are several potential research topics that are relevant to the current study. First, our model might be applied to various law enforcement settings, including the regulation of companies' activities. In the context of political competition, climate change emerges as a critical issue, and political parties consider regulating companies' actions accordingly. One party may manipulate the issue by providing misinformation about climate change to suit its advantage, while the other party may argue for more lenient regulation and attempt to manipulate voters' beliefs in line with its intentions. Exploring how these political campaigns influence resulting regulations for companies could be an intriguing area for future research. Second, our model assumes that voters and criminals are different groups. Although this assumption may be valid when law enforcement applies to major crimes, it does not address minor criminal cases, such as speeding tickets and double-parking. In those cases, offenders (criminals) can affect law enforcement through voting, so the equilibrium platforms may change. To investigate those minor crime cases in our model, we would have to modify it to address more general settings. Third, our model assumes that the probability of voters being exposed to a party's campaign is independent of the voters' partisanship. However, in reality, campaign effects and partisanship may be correlated. To investigate that case, future research will need to generalize the model. Fourth, in the campaign competition stage, we do not explicitly consider media outlets' behavior. However, in reality, media outlets' behavior may influence the effectiveness of a political campaign. Additionally, media outlets have a crucial effect on voters' perceptions. Future research will require a model that explicitly incorporates media outlets' behavior.[72]

Finally, in this study, we do not intend to argue that the mechanism we provide is the only explanation for the increasing punitiveness of law enforcement. However, we believe that the model sheds light on a new perspective to explain modern penal society.

Appendix E: Multidimensional policy space

In this study, we consider political competition involving a single policy dimension, specifically law enforcement policy. We make the assumption that one party (referred to as party A) possesses issue ownership in policing crimes, leading to the following dynamics: party A has an

[72] Enns (2016) shows how media exposure affects the public's punitive attitudes. Furthermore, several models investigate the relationship between media outlets' behavior and the political process. For a survey, see Prat and Strömberg (2013).

incentive to exaggerate the severity of crime, while party B has an incentive to downplay its severity.

However, the existing literature on issue ownership theory and campaign contests (Amorós and Puy, 2013; Aragonès et al., 2015; Egorov, 2015; Dragu and Fan, 2016; Denter, 2020) assumes a multidimensional policy space, where each party possesses issue ownership in different policy areas. These studies investigate how variations in issue ownership affect the strategies of political parties. Consequently, one might question how our one-dimensional model aligns with the discussion on issue ownership.

In this appendix, we expand our model to incorporate a multidimensional setting and explore its impact on our main result. Through this extension, we demonstrate our implicit assumption in the main sections that party A holds a comparative advantage in policing crimes compared to another policy dimension. As long as this assumption holds, our result remains unchanged. However, if party A possesses a comparative advantage in a different policy dimension, the result will reverse, even if party A has an absolute advantage in policing crimes.

Let us consider the simplified version of our model. Suppose that there are only uninformed voters and they are divided into two groups: group A and group B. We suppose that group A's perception of criminal harm is affected by party A, while that of group B is affected by party B. To simplify the discussion, we assume that the size of each voter group is the same, i.e., $1/2$.

There are two political issues. The first is law enforcement policy, i.e., the probability of arrest $p \in [0, 1]$. The second is allocating public goods, $G \geq 0$. In the policy proposal stage, we assume that two political parties A and B propose two policies (p_P, G_P) within budget constraint $I > 0$. Therefore, the model represents a budget allocation problem between law enforcement policy and other public goods. To simplify the discussion, we assume that the budget constraint is the same for each party.

Then, each party solves the following constrained maximization problems.

$$\max_{p_A, \sigma_A} \; W_A(p_A, p_B, G_A, G_B, \sigma_A, \sigma_B) \quad \text{s.t. } I \geq \delta m p + \zeta G. \tag{4.32}$$

$$\max_{p_B, \sigma_B} \; W_B(p_A, p_B, G_A, G_B, \sigma_A, \sigma_B) \quad \text{s.t. } I \geq m p + G, \tag{4.33}$$

where δ and ζ represent the cost advantage/disadvantage of party A for each policy relative to party B. For example, if $\delta < 1$, party A holds an advantage over party B in the domain of policing crimes. Similarly, if $\zeta < 1$, party A possesses an advantage in the allocation of public goods (i.e., allocating public goods more efficiently). Obviously, in equilibrium, the budget constraints become binding. As discussed in the main sections, one possible interpretation of this cost advantage is the reputation/expertise accumulated by a party over time (Petrocik, 1996). This expertise enhances the party's efficiency in proposing policies, which in turn is valued by the voters.

Next, we define the utility function of voter i in group $g \in \{A, B\}$. The utility function can be written as

$$u_i = -\gamma(h_g q)^2 + G, \tag{4.34}$$

where h_g is the perception of criminal harm among voters in group $g \in \{A, B\}$. As in the main sections of the study, we assume that uninformed voters have upward bias $\Delta > 0$, so their prior perception of criminal harm is $\tilde{h} = h + \Delta$. Furthermore, we suppose that parties can manipulate uninformed voters' belief by $\sigma_P \in [-\sigma, \sigma]$. Therefore, $h_g = \tilde{h} + \sigma_P$, where $g = P$.

The timing of the game is the same as in the main sections.

- Stage 1: Political parties announce a law enforcement policy $p_P \in [0, 1]$ and amount of public goods $G_P \geq 0$ within budget constraint $I > 0$.
- Stage 2: Political parties choose a misinformation/information level $\sigma_P \in [-\sigma, \sigma]$. Voters in group A are affected by party A's campaign, while voters in group B are affected by party B's campaign.
- Stage 3: Voters vote for the party that provides higher utility.
- Stage 4: The party that obtains half of the vote will win and implement the policy. Potential criminals choose whether they will commit a crime under the implemented law enforcement.

Under those settings, we will check the equilibrium policy. First, we will calculate the winning probability of each party. Suppose that the parties propose $(p_A, G_A), (p_B, G_B)$, respectively. Then, voter i in group g prefers A to B if

$$-\gamma c^2 h_g^2(1-p_A)^2 + G_A > -\gamma c^2 h_g^2(1-p_B)^2 + G_B + \eta_{ig}, \tag{4.35}$$

where η_{ig} is an idiosyncratic affinity toward party B and η_{ig} is uniformly distributed on $[\eta - \frac{1}{2\psi}, \eta + \frac{1}{2\psi}]$. Additionally, η denotes aggregate uncertainty and is uniformly distributed on $[-\frac{1}{2\phi}, \frac{1}{2\phi}]$. Note that in equilibrium, $G_A = \frac{I-\delta m p_A}{\zeta}$ and $G_B = I - mp_B$ hold. Therefore, (4.35) can be rewritten as

$$\begin{aligned} & -\gamma c^2 h_g^2(1-p_A)^2 + \frac{I-\delta m p_A}{\zeta} > -\gamma c^2 h_g^2(1-p_B)^2 + I - mp_B + \eta_{ig} \\ & \Leftrightarrow 2\gamma c^2 h_g^2(p_A - p_B) - \gamma c^2 h_g^2(p_A^2 - p_B^2) + \frac{I-\delta m p_A}{\zeta} - (I - mp_B) > \eta_{ig}. \end{aligned} \tag{4.36}$$

Since η_{ig} is uniformly distributed on $[\eta - \frac{1}{2\psi}, \eta + \frac{1}{2\psi}]$, the proportion of voters who vote for A in group g can be calculated as

$$\psi\big[2\gamma c^2 h_g^2(p_A - p_B) - \gamma c^2 h_g^2(p_A^2 - p_B^2) + \frac{I-\delta m p_A}{\zeta} - (I - mp_B) - \eta + \frac{1}{2\psi}\big]. \tag{4.37}$$

If the total vote share is more than 1/2, party A will win the race. Because the size of each group is 1/2, party A will win the race if

$$\psi\big[2\gamma c^2 \frac{\Sigma_g h_g^2}{2}(p_A - p_B) - \gamma c^2 \frac{\Sigma_g h_g^2}{2}(p_A^2 - p_B^2) + \frac{I-\delta m p_A}{\zeta} - (I - mp_B) - \eta + \frac{1}{2\psi}\big] > \frac{1}{2}. \tag{4.38}$$

Let us define $\Omega = \frac{\Sigma_g h_g^2}{2}$, representing the squared value of weighted average perception of criminal harm among voters. Since η is uniformly distributed on $[-\frac{1}{2\phi}, \frac{1}{2\phi}]$, the winning probability of A can be written as

$$W_A = \phi\big[2\gamma c^2 \Omega(p_A - p_B) - \gamma c^2 \Omega(p_A^2 - p_B^2) + \frac{I-\delta m p_A}{\zeta} - (I - mp_B) + \frac{1}{2\phi}\big]. \tag{4.39}$$

Following the same logic, the winning probability of party B can be calculated as

$$W_B = \phi\big[2\gamma c^2\Omega(p_B - p_A) - \gamma c^2\Omega(p_B^2 - p_A^2) + (I - mp_B) - \frac{I - \delta m p_A}{\zeta} + \frac{1}{2\phi}\big]. \tag{4.40}$$

Following the same logic as Proposition 4.2, we can verify that if $p_A > p_B$ holds, $\frac{\partial W_A}{\partial h_A} > 0$, while $\frac{\partial W_B}{\partial h_B} < 0$. This means that party A has the incentive to choose $\sigma_A = \sigma$, while party B has the incentive to choose $\sigma_B = -\sigma$, which is the same conclusion as Proposition 4.2. However, different from the one-dimensional case discussed in the main analysis, we need further conditions to verify that $p_A > p_B$ holds in equilibrium.

To see this, consider the optimization problem of party A. By differentiating the winning probability with respect to p_A, we have

$$\frac{\partial W_A}{\partial p_A} = \phi\big[2\gamma c^2\Omega - 2\gamma c^2\Omega p_A - \frac{\delta m}{\zeta}\big]. \tag{4.41}$$

By the first-order condition, we have[73]

$$p_A = \frac{\Omega - \frac{\delta m}{2\gamma c^2\zeta}}{\Omega}. \tag{4.42}$$

Following the same logic, we can obtain the equilibrium policy p_B as follows.

$$p_B = \frac{\Omega - \frac{m}{2\gamma c^2}}{\Omega}. \tag{4.43}$$

From this, we can verify that $p_A > p_B \Leftrightarrow \delta < \zeta$.

In other words, party A has the incentive to set the probability of arrest higher than does B if it has a comparative advantage in policing crime (δ) compared to allocating public goods (ζ). As long as this condition holds, we reach the same conclusion as in Proposition 4.2: party A has an incentive to overstate the severity of criminal harm, while party B has an incentive to understate the severity of criminal harm.

On the other hand, even if party A has an absolute advantage in policing crime (i.e., $\delta < 1$) but has a comparative advantage in another issue (i.e., $\delta > \zeta$), the conclusion will reverse: party A has the incentive to understate the severity of crime by proposing a lower probability of arrest p_A than party B. The interpretation is simple: if A has a comparative advantage in

[73]To simplify the discussion, we omit the case where $p_P = 0$.

allocating public goods, it has an incentive to increase the salience of this issue. To achieve this, A attempts to understate/correct voters' beliefs about the severity of the crime and divert voters' interest from policing crimes to allocating public goods. In our one-dimensional model, however, the absolute advantage of policing crime ($\delta < 1$) is sufficient to conclude that party A is incentivized to overstate the severity of crime because there is only one policy issue.

Finally, we would like to show that the implication of Proposition 4.4 (i.e., the political campaign leads to harsh enforcement) remains unchanged even in a multidimensional case. By differentiating p_A, p_B with respect to σ, we have

$$\frac{\partial p_A}{\partial \sigma} = \frac{\delta m/2\gamma c^2 \zeta}{\Omega^2}\frac{\partial \Omega}{\partial \sigma}, \quad \frac{\partial p_B}{\partial \sigma} = \frac{m/2\gamma c^2}{\Omega^2}\frac{\partial \Omega}{\partial \sigma}. \tag{4.44}$$

Therefore, if $\partial\Omega/\partial\sigma > 0$ holds, a political campaign leads to harsher law enforcement. In this simplified example, this always holds. Note that $\Omega = \frac{\Sigma_g h_g^2}{2}$. Then, we have

$$\frac{\partial \Omega}{\partial \sigma} = \underbrace{(\tilde{h}+\sigma)}_{\text{group A}} - \underbrace{(\tilde{h}-\sigma)}_{\text{group B}} > 0. \tag{4.45}$$

Following the same logic, even when we consider the general case as in the main sections (i.e., considering informed voters and asymmetry in the probability of being exposed to each party's political campaign), we obtain the same condition, $\alpha > \frac{1}{2} - \frac{\sigma}{2\tilde{h}}$, as in Proposition 4.4.

Appendix F: Endogenous campaign contest

In this appendix, we will show that the probability of exposure to each party's campaign α and $1-\alpha$ can be determined endogenously by incorporating the campaign contest between the two parties, but this does not affect the main result.

Suppose that the probability that voters are exposed to P's political campaign is determined by the contest success function, instead of being determined exogenously.[74] We define the probability that voters are exposed to A's political campaign as

$$\pi(C_A, C_B) = \begin{cases} \frac{\alpha C_A}{\alpha C_A + (1-\alpha)C_B} & \text{if } C_A + C_B > 0 \\ \alpha & \text{if } C_A = C_B = 0, \end{cases} \tag{4.46}$$

[74]For the contest success function, see Skaperdas (1996).

where $\alpha \in (0,1)$ and $C_P, P \in \{A, B\}$ is campaign spending by party P. The probability that voters are exposed to B's political campaign is defined as $1 - \pi(C_A, C_B) = \frac{(1-\alpha)C_B}{\alpha C_A + (1-\alpha)C_B}$. In this definition, each party not only chooses the misinformation/information level $\sigma_P \in [-\sigma, \sigma]$ but also the campaign spending C_P in stage 2.

Note that if $C_A = C_B$ then $\pi(C_A, C_B) = \alpha$ holds. Therefore, α can be interpreted as the relative campaign effectiveness of party A. If $\alpha > \frac{1}{2}$, A has greater campaign effectiveness than B, and more voters are likely to be exposed to A's campaign rhetoric. For example, if party A has an advantage in media appeal, voters may be more likely to be exposed to A's campaign with the same amount of spending. Then, α can be higher than $\frac{1}{2}$.

The amount of campaign spending determines the probability with which voters are exposed to a party's political misinformation/information.[75] Since the political campaigns impose a cost of C_P, the payoff function of political parties P can be defined as

$$u_P = W_P(p_A, p_B, \sigma_A, \sigma_B, C_A, C_B) - \frac{(C_P)^2}{2}, \tag{4.47}$$

where W_P is the winning probability of party P. Parties choose the direction of information σ_P to align with their platform and choose campaign spending C_P such that more voters are exposed to their political campaign.

Under the endogenous version of the probability of exposure to a political campaign, Proposition 4.2 changes in the following way.

Proposition 4.5. In the equilibrium of stage 2, party A proposes $\sigma_A = \sigma$ and B proposes $\sigma_B = -\sigma$. Additionally, $C_A = C_B$ and $\pi(C_A, C_B) = \alpha$ hold.

Proof. We will show how σ_P is determined. Note that $h_A = \tilde{h} + \sigma_A$ and $\sigma_A \in [-\sigma, \sigma]$. By differentiating W_A with respect to h_A, we have

$$\frac{\partial W_A}{\partial h_A} = \lambda \pi(C_A, C_B)\phi[4\gamma h_A c^2(p_A - p_B) - 2\gamma h_A c^2(p_A^2 - p_B^2)]. \tag{4.48}$$

Note that $\pi(C_A, C_B) \in (0,1)$ because there is no equilibrium in which just one party devotes

[75]In this setting, we assume that the probability of each voter being exposed to P's political campaign is independent of idiosyncratic affinities, i.e., voters' partisanship. A more realistic assumption may be that the probability is correlated with voters' partisanship. For example, partisan exposure theory shows that voters' partisanship affects the probability of exposure to a party's campaign (Stroud, 2010, 2011). However, the correlation with idiosyncratic affinities makes the problem highly nonlinear and difficult to solve, so we do not apply this approach. See Grossman and Helpman (2023).

positive campaign spending. In this case, the party can reduce its campaign spending without changing $\pi(C_A, C_B)$. Then, $\frac{\partial W_A}{\partial h_A}$ must be positive because

$$\begin{aligned} 4\gamma h_A c^2(p_A - p_B) - 2\gamma h_A c^2(p_A^2 - p_B^2) > 0 \\ \Leftrightarrow 2 > p_A + p_B. \end{aligned} \tag{4.49}$$

Since $\frac{\partial W_A}{\partial h_A} > 0$ holds, party A has an incentive to increase h_A, and $\sigma_A = \sigma$ holds. Following the same logic, we can check that $\frac{\partial W_B}{\partial h_B} < 0$. Therefore, party B has an incentive to decrease h_B, and $\sigma_B = -\sigma$ holds.

Based on these facts, we can derive the equilibrium campaign spending C_P. The payoff function of A and B can be written as

$$\begin{aligned} u_A = (1-\lambda)\phi[u(p_A, m_A, h) - u(p_B, m_B, h) + \frac{1}{2\phi}] \\ + \lambda\pi(C_A, C_B)\phi[u(p_A, m_A, h_A) - u(p_B, m_B, h_A) + \frac{1}{2\phi}] \\ + \lambda(1 - \pi(C_A, C_B))\phi[u(p_A, m_A, h_B) - u(p_B, m_B, h_B) + \frac{1}{2\phi}] - \frac{(C_A)^2}{2}. \end{aligned} \tag{4.50}$$

$$\begin{aligned} u_B = (1-\lambda)\phi[\frac{1}{2\phi} - (u(p_A, m_A, h) - u(p_B, m_B, h))] \\ + \lambda\pi(C_A, C_B)\phi[\frac{1}{2\phi} - (u(p_A, m_A, h_A) - u(p_B, m_B, h_A))] \\ + \lambda(1 - \pi(C_A, C_B))\phi[\frac{1}{2\phi} - (u(p_A, m_A, h_B) - u(p_B, m_B, h_B))] - \frac{(C_B)^2}{2}. \end{aligned} \tag{4.51}$$

Since $h_A = \tilde{h} + \sigma > h_B = \tilde{h} - \sigma$, $u(p_A, m_A, h_A) - u(p_B, m_B, h_A) > u(p_A, m_A, h_B) - u(p_B, m_B, h_B)$ holds.[76] Then, there is no equilibrium in which $C_A = C_B = 0$. If each party increases its campaign spending by an infinitesimally small amount, it can improve its payoff with essentially no cost.

If $C_A + C_B > 0$, we have $\frac{\partial \pi}{\partial C_A} = \frac{\alpha(1-\alpha)C_B}{[\alpha C_A + (1-\alpha)C_B]^2} > 0$, $\frac{\partial^2 \pi}{\partial C_A^2} = \frac{-2\alpha^2(1-\alpha)C_B}{[\alpha C_A + (1-\alpha)C_B]^3} < 0$, $\frac{\partial \pi}{\partial C_B} =$

[76] That is, provided that $p_A > p_B$, $u(p_A, m_A, h) - u(p_B, m_B, h)$ is increasing with respect to h.

$-\frac{\alpha(1-\alpha)C_A}{[\alpha C_A+(1-\alpha)C_B]^2} < 0$ and $\frac{\partial^2\pi}{\partial C_B^2} = \frac{2\alpha(1-\alpha)^2 C_A}{[\alpha C_A+(1-\alpha)C_B]^3} > 0$. Then, we have $\frac{\partial u_A}{\partial C_A}\Big|_{c=0} > 0$, $\frac{\partial^2 u_A}{\partial C_A^2} < 0$, $\frac{\partial u_B}{\partial C_B}\Big|_{c=0} > 0$ and $\frac{\partial^2 u_B}{\partial C_B^2} < 0$. Therefore, this is a concave function. By first-order condition, we have

$$\lambda\frac{\partial\pi(C_A,C_B)}{\partial C_A}\phi[u(p_A,m_A,h_A)-u(p_B,m_B,h_A)+\frac{1}{2\phi}] \\ -\lambda\frac{\partial\pi(C_A,C_B)}{\partial C_A}\phi[u(p_A,m_A,h_B)-u(p_B,m_B,h_B)+\frac{1}{2\phi}] = C_A. \quad (4.52)$$

Following the same logic, we have the first-order condition of party B as

$$\lambda\frac{\partial\pi(C_A,C_B)}{\partial C_B}\phi[\frac{1}{2\phi}-(u(p_A,m_A,h_A)-u(p_B,m_B,h_A))] \\ -\lambda\frac{\partial\pi(C_A,C_B)}{\partial C_B}\phi[\frac{1}{2\phi}-(u(p_A,m_A,h_B)-u(p_B,m_B,h_B))] = C_B. \quad (4.53)$$

Note that $\frac{\partial\pi}{\partial C_A} = \frac{\alpha(1-\alpha)C_B}{[\alpha C_A+(1-\alpha)C_B]^2}$ and $\frac{\partial\pi}{\partial C_B} = -\frac{\alpha(1-\alpha)C_A}{[\alpha C_A+(1-\alpha)C_B]^2}$. Then, by dividing this equation, we have

$$\frac{C_B}{C_A} = \frac{C_A}{C_B} \Leftrightarrow C_A = C_B. \quad (4.54)$$

Therefore, $\pi(C_A,C_B)=\alpha$ must hold in equilibrium. □

As a result, even if we assume that the probability of exposure to party P's campaign is endogenously determined, the resulting probabilities remain the same. Therefore, the main result of this study does not change.

5 Concluding remarks

5.1 Summary

In this section, we provide a brief summary of each chapter.

Chapter 2: Issue selection, media competition, and polarization of salience

This chapter analyzes the interplay between media competition and parties' issue selection strategies in influencing issue salience and electoral outcomes. To this end, we develop an issue selection model that incorporates the profit-maximization behavior of media outlets. Using the model, firstly, we demonstrate that media outlets' issue coverage diverges; that is, each media outlet can emphasize a different issue to maximize their viewership. Additionally, we show that the interaction between competition among media outlets and the strategic issue selection by parties contributes to the *polarization of issue salience*. In other words, different groups of voters perceive distinct issues as important when deciding their vote. Finally, we provide evidence that this polarization increases the vote share of a party that offers lower-quality policy proposals. This suggests that the interaction between media competition and parties' issue selection may have a detrimental effect on society. We believe that this analysis contributes to a better understanding of the role of media competition and issue salience in electoral competition, which is an understudied area in the existing theoretical literature.

Chapter 3: Issue selection, inequality, and polarization of social ideologies

In this chapter, we develop a model that examines issue selection among liberal and conservative parties with fixed social ideological positions and explores how their campaign strategy interacts with tax policy proposals (income distribution). Our analysis reveals that as social ideologies become more polarized, both parties seek to influence the salience weights of low-income/conservative voters. This targeting strategy motivates conservative parties to prioritize social ideological problems, while liberal parties place greater emphasis on addressing economic distribution issues. Furthermore, our analysis of this equilibrium illustrates that when voters become more inclined toward social issues during a political campaign, both parties are inclined to advocate for tax reductions.

These findings highlight the critical role played by the level of polarization in social ideologies in determining which issues each party chooses to emphasize and which voter type each party chooses to target in their campaigns. Additionally, our results shed light on why parties may propose lower tax rates, even when income inequality is on the rise, from the perspective of issue salience. The underlying mechanism behind our findings may align with an often-held view: the right-wing party's strategy of increasing the salience of religious issues redirects the attention of low-income voters away from economic concerns and toward religious matters, potentially pushing economic policy further to the right.

Chapter 4: Law enforcement and political misinformation

In this chapter, we aim to address the following question: Why has criminal law enforcement adopted a more punitive approach, despite improvements in the situation over the years? This chapter offers an explanation by assuming that political parties influence voters' perceptions of crime through misinformation. To achieve this, we develop a model that combines a law enforcement model with a political competition model to explore how political parties' campaigns shape voters' perceptions of crime and the resulting law enforcement policies. During a political campaign, we illustrate that the party that has issue ownership of crime-related issues has an incentive to exaggerate the severity of crime, while the opposing party has a motive to correct voters' beliefs. However, our key finding suggests that even though the two parties attempt to shift voters' beliefs in opposite directions, the overall effect of a political campaign is more likely to push both parties' policies towards a more punitive stance.

This result is driven by the straightforward fact that voters experience increasing marginal disutility as the severity of criminal harm worsens. Although this logic may seem simple, we argue that this mechanism accurately reflects reality: voters are more receptive to political discourse that exaggerates the crime situation than to messages aimed at correcting their perceptions of crime. We believe that the model sheds new light on the interaction between law enforcement, political party strategies, and voter perceptions, providing a possible explanation for why law enforcement can adopt a punitive approach irrespective of the actual crime situation.

5.2 Future research topics

At the end of each chapter, we have already mentioned future research topics regarding that chapter. Therefore, here, we would like to briefly discuss a future research topic that we consider to be notably important.

The first topic involves investigating the informative aspect of issue selection, as previously mentioned in the introduction. The informative aspect of issue selection holds significant importance in addressing the question: How does a party's issue selection strategy affect social welfare? To answer this question, we need to simultaneously consider both the distortionary and informative aspects of issue selection. As referenced in the relevant literature section of the introduction, the literature on campaign advertising and finance has already explored this point. For instance, Polborn and Yi (2006) examined the possibility that negative campaigns can efficiently transmit both candidates' types, while Prat (2002); Coate (2004); Ashworth (2006) proposed the idea that campaign advertisements can directly or indirectly convey information about candidate types in the context of special interest politics. Similarly, there is a possibility that a party's issue selection strategy can transmit information about the issue. For example, it may convey the importance of issues ignored by voters or it may transmit the candidates' stance regarding a specific issue, potentially assisting voters in their choice. This topic is worth investigating, and we believe it represents a crucial next step in understanding the normative evaluation of issue selection strategy.

The second topic involves investigating the role of social media in issue selection, which is closely related to Chapter 2. In recent years, social media has become increasingly prevalent and has assumed a crucial role in politics, potentially even supplanting traditional media outlets such as newspapers and TV. Therefore, we need to address the question: "How does the rise of social media influence issue salience, parties' strategic issue choices, and how does this transformation impact electoral outcomes?" One possibility is that social media can enhance parties' ability to manipulate issue salience due to increased exposure to campaign ads. Additionally, social media may permit candidates to engage in "micro-targeting," allowing them to consider voters' characteristics and employ more nuanced targeting in their advertisements. However, a second possibility is that social media empowers voters to select information by themselves, rendering them less susceptible to campaign influence regarding issue selection. In this scenario, we might observe significant divergence in issue salience as voters prioritize their individual interests. To the best of my knowledge, there is limited theoretical research on this topic.[77] This area shows

[77] One related approach may be Matějka and Tabellini (2021), which investigates how voters' selective ignorance regarding political issues, accelerated by social media, affects the policy designs of candidates.

promise for future research and is of considerable interest.

The third topic worth exploring is how parties' issue selection campaigns interact with media reporting in a law enforcement setting, as discussed in Chapter 4. While we did not explicitly assume the role of media outlets in Chapter 4, it is undeniable that media reporting on crime affects voters' perceptions of the crime situation and subsequently influences parties' strategies in framing crime-related issues. To the best of my knowledge, there is no theoretical paper that investigates how media reporting affects electoral outcomes in the context of law enforcement. This is also a promising and intriguing direction for future research.

In any case, theoretical investigations into parties' issue selection strategies in an election remain relatively underexplored. More research is needed to enhance our understanding of this area.

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