

# Flip-flopping: contrasting effects of intense primaries and general elections on selection of candidates\*

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## Abstract

We present an incomplete information model of two-stage electoral competition, in which candidates can choose different platforms in the primary and in the general election stage. Voters do not directly observe the chosen platforms; instead several signals (debates, main speeches) are drawn from these platforms and publicly announced; the bigger the number of signals the higher the intensity of the election process. This model explains two empirical observations: first, candidates pander to the base of the party during the nomination stage and shift to the center once the nomination is secured; and second, intense primaries are detrimental to a party's chances to win the election. Further we demonstrate that intensity of primaries and that of general elections have the opposite effects on the selection process. Other things being equal, intense primaries tend to select extreme candidates, while intense general elections tend to select moderate ones. We confirm these predictions using US congressional data from 1998. Finally, we provide data from a controlled laboratory experiment which shows that voters understand the trade-offs that candidates face in two-stage elections and behave in a manner that is consistent with the theory predictions.

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# 1 Introduction

*"Barack Obama has been performing a more traditional manoeuvre: running to the left during the primaries, when party activists need to be wooed, then shifting to the center once the nomination is clinched" - BBC news (July 5, 2008).*

In the United States, primaries are an integral part of most elections including presidential, congressional and gubernatorial races.<sup>1</sup> According to the standard two-stage electoral process, candidates must obtain their party's nomination before competing in the general election. Two well-established facts about primaries are (1) candidates tend to pander to their party's base during the primaries and shift to the center once the nomination is secured, and (2) hard-fought primaries are detrimental to a party's chances of winning the election. The first observation is part of a conventional wisdom from media analysts and political consultants (see quote above), and stems from the notion that voters in primaries are more extreme than those in general elections.<sup>2</sup> The second observation, which draws on extensive empirical data tracing elections for all major offices in the US in the last 50 years, outlines the so-called "divisive primary" hypothesis: see, for example, Born [1981], Kenney and Rice [1984], and Lengle, Owen and Sonner [1995].

The two observations above are hardly a surprise: they have been around for more than two decades. What is surprising is that the literature lacks a model that can deliver these results simultaneously. The reason is that most existing models use one of two extreme assumptions. Either they assume the possibility of binding commitments to electoral platforms (see Wittman [1983] and Calvert [1985] for one-stage election model and Coleman [1972] for two-stage election model) or that announcements made by candidates are purely cheap talk (see Alesina [1988]). Clearly, a model with either of these two extreme assumptions cannot explain the flip-flopping behavior of candidates and/or the detrimental effect of the intense primary race on the party's chances to win elections.

In this paper we provide a model of two-stage electoral competition that delivers both stylized facts described above: candidates take more extreme positions in primaries than in general elections, and intense primaries decrease a party's chances to win elections. In addition, this model produces a new observation that distinguishes between the impact of intense primaries and intense general elections on the selection of candidates. Other things being equal, intense primaries tend to select more extreme legislators, while intense general elections tend to select more moderate ones. Using US congressional data from 1998, we show that these effects are present and noteworthy.

The basic structure of the model is as follows. There are two Democratic candidates competing for office. Victory requires winning both the primary stage and the general election stage in which the winner of the primary faces a Republican incumbent with a fixed position. Each candidate is equally likely to have liberal ( $L$ ) or moderate ( $M$ ) type, where  $L$  is close to the position of the median Democrat and  $M$  is close to the position of the median voter in the general election. The type of a candidate is his private information. In the nomination stage, two candidates compete by choosing platforms, which are a probability distribution over positions  $L$  and  $M$ . These plat-

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<sup>1</sup>The use of primaries is not restricted to the United States. In Latin America, there are 15 countries in which at least one of the political parties selects a presidential candidate using the primary election (see Carey and Polga-Hecimovich [2006]).

<sup>2</sup>For rigorous evidence that supports the first observation, see Burden [2001] who, using US congressional data, documents that candidates adopt more extreme positions in primaries than in general elections.

forms represent how strongly a candidate emphasizes different issues in his campaign.<sup>3</sup> A candidate that misrepresents his true type bears costs. Voters do not directly observe the chosen platforms; instead  $m$  signals are drawn from these platforms and publicly announced. We treat these signals as main events during which a candidate expresses his views (debates, public speeches), with each event providing one signal about the type of a candidate. A higher number of signals corresponds to a higher intensity of the election process. The winner of the primary again chooses a platform (possibly a different one) in the general election and voters observe the sample of  $k$  signals drawn from it. The winner of the general election implements his preferred policy.

In equilibrium, candidates flip-flop by pandering to the median Democrat during the nomination stage and shifting to the center once the nomination is obtained, while voters elect a “more liberal” candidate during the primary stage. More precisely, in the primary, liberal candidates always send  $L$  messages, while moderate ones, to some extent, mimic the behavior of liberals. On the contrary, in the general election, a moderate challenger is the one that always sends  $M$  signals, while a liberal challenger partially mimics him. The extent to which candidates mimic each other depends on the cost of misrepresenting one’s true type and the intensity of each stage.

The core of the analysis is the study of the impact of intense primaries on the chances of the Democrats winning the general election. An increase in the number of signals in the primary race has two effects. As the number of signals in the primary grows, so does the chance that the moderate type will send at least one  $M$  message, which fully reveals him as moderate type. Thus, he will lose the nomination more often. In addition, the “shift to the center” performed by the liberal challenger is smaller, which means that he loses the election more often. While the first effect is straightforward, the mechanics behind the second one are less transparent. The liberal challenger is willing to pay the cost of sending more  $M$  messages in the general election stage when voters believe that he has a higher chance of being an  $M$  type after the primary stage. When the number of signals in the primary is big, this belief is low, because voters observed many  $L$  messages this candidate sent in the primary and, thus, are quite certain that his type is  $L$ . Both effects contribute to the overall decrease of Democrats’ chances to win the election when primaries are intense, which is precisely the “divisive primary” hypothesis we discussed above.

As we mentioned above, Democratic voters prefer liberal candidates to win the primary. Therefore, the benefit of an intense primary is that liberal candidates win the nomination more often. This, however, also has an implication for the final selection of candidates: all other things being equal, more extreme candidates will emerge from more intense primaries. On the contrary, when a general election becomes more intense, moderates are more likely to win it. The driving force behind this result is that moderate candidates put more effort in misrepresenting their true type during the primary in order to win the nomination.

Changing the intensities of the primary and the general election stages affects the welfare of the Democrats and that of the entire population. We show that when the incumbent occupies a conservative position, the society as a whole benefits from the higher intensity of the general election stage as moderates are elected more often. On the contrary, an intense primary stage decreases the welfare of the society when general elections are intense. Finally, an increase in the intensity

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<sup>3</sup>The more weight a candidate puts on position  $L$ , the more he will stress issues that appeal to the base of the Democratic Party. On the contrary, the more weight is on position  $M$ , the more often a candidate will raise issues that are close to the hearts and minds of moderate voters.

of the nomination stage affects differently the welfare of the Democrats depending on the location of the incumbent: Democrats benefit from a better selection process achieved through the intense primary if the incumbent is centrist and suffer if he is (very) conservative.

To test the effects of intense primaries and general elections on the selection of candidates, we use congressional data from 1998. We find that controlling for the intensity of the general election, districts with intense primaries elect more extreme legislators, while controlling for the intensity of the primary, districts with intense general elections elect more moderate legislators. The results are robust when we also control for spatial differences between districts, which means that an alternative model with candidates committing to the platforms at the beginning of the nomination process cannot explain these effects.

We supplement empirical results by controlled laboratory experiments, in which we study whether voters understand the trade-offs candidates face in two-stage elections and recognize that they should support the more liberal candidate in the primary election. We focus on the effects of the intensity of the primary stage and run two treatments: of low and high intensity, in which during the primary stage, voters observe 1 and 7 messages, respectively. In the experiment, we observe not only the behavior of the voters in each treatment, but also elicit the beliefs voters hold regarding the true types of candidates, given observed signals. This latter data is what makes the experimental setting so attractive, because it allows us to study the belief formation process otherwise unobserved in the field. The results of the experiment suggest that voters elect the more liberal (according to their beliefs) candidate in the primary stage. Moderate candidates correctly anticipate that behavior and mimic liberal candidates, with more mimicking occurring in the low than in the high intensity treatment as predicted by the model. Finally, we find an interesting pattern in the belief formation process. Bayes rule seems to explain well beliefs when voters observe all  $L$  messages. However, when one or more  $M$  messages are observed, a significant fraction of voters do not update beliefs correctly especially in the low intensity treatment. In addition, in the high intensity treatment, voters' beliefs are sensitive to the number of  $M$  messages, which according to the theory should not be the case since one  $M$  message fully reveals the moderate type.<sup>4</sup>

The rest of the paper is structured as follows. The remainder of this section discusses the related literature. Section 2 lays out the model and other preliminaries. In section 3 we characterize the pandering equilibrium and discuss comparative statics. Section 4 provides welfare analysis. Evidence from the field is presented in section 5 and evidence from the lab in section 6. In section 7 we address the question of the uniqueness of pandering equilibrium and discuss which results won't go through if the uncertainty in a general election is not big enough. At last, we show that moderate candidates are less likely to enter the primaries stage than extreme ones when primaries are intense, given that candidates incur fixed costs of entering the election. The conclusions are presented in section 8.

## 1.1 Literature review

The model presented here belongs to the literature that studies information transmission through electoral competition. Banks [1990] develops the first signaling model of elections, in which the elected candidate incurs the cost of lying measured by the difference between his campaign promise

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<sup>4</sup>In other words, voters are more certain that a sequence with five  $M$  messages came from the moderate candidate than a sequence with one  $M$  message.

and an implemented policy. Banks shows that if costs of lying are above critical value, then in equilibrium extreme candidates are willing to reveal their true type, while the moderate ones pool together. Callander and Wilkie [2007] extend Banks [1990] to allow candidates to have heterogeneous costs of lying and find that, although liars are favored in the elections, the honest types are not always defeated. Kartik and McAfee [2007] study a related situation, in which a fraction of candidates have a "character" and are exogenously committed to a campaign platform. Voters value both candidate's character and his policy position; however, they do not observe whether or not a politician has a character. Thus, voters try to infer both the policy preferences and the character of the candidate from announced platforms. In equilibrium, strategic candidates pretend to have positions of candidates with character and most elections result in a tie. Finally, Bernhardt and Ingberman [1985] take a different approach in modeling the costly movements of candidates. They assume that candidates are tied to their reputations (previous positions): the more a given candidate diverges from his reputation the more uncertain voters become about the outcomes that would occur should that candidate win the election. The authors show that in a world of risk-averse voters, a "consistent" incumbent is perceived as a lottery with smaller variance than any challenger, which naturally generates an incumbency advantage.

Our model is also a signaling model. However, we depart from the models discussed above in that we study elections with two stages, in which candidates face electorates with different preferences in the primary and in the general election stages. This feature is what prevents the extrapolation of the results from elections with only one round (as in Banks [1990], Callander and Wilkie [2007], and Kartik and McAfee [2007]<sup>5</sup>) to the sequential ones and raises the natural question of how much information about candidates' preferences is revealed in two-stage elections. This is the question we study in this paper.

In the papers discussed above, candidates were the ones that possessed private information about their type and/or character, and voters tried to infer this information from the candidates' announcements. Adams and Merrill [2008] study another informational structure. As in Kartik and McAfee [2007], in Adams and Merrill [2008] voters value valence characteristics of candidates in addition to their policy positions. However, the authors distinguish between valence characteristics known before the beginning of the campaign, such as candidates' reputations for competence, integrity, and leadership ability, and the unknown ones, such as the campaigning abilities of candidates. These unknown characteristics are the ones that voters *and* candidates discover during the primary stage, and the candidates that have the stronger campaign abilities are selected through the primary competition.<sup>6</sup>

There are two other lines of research that study how primary races affect the selection of candidates. The first one acknowledges the polarizing effect of primary elections in a setting where policies an-

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<sup>5</sup>Basic model presented in Kartik and McAfee [2007] is the one-stage election model. However, the authors also discuss the simplified version of the two-stage elections in the discussion section of the paper. As the authors say, "rather than presenting an exhaustive analysis, our goal is to only suggest how the central theme of the paper can be extended to such settings, with interesting implications." In this extension authors show that the character of candidates matters. Our focus is different from the one in Kartik and McAfee [2007] as we study the effects of the intensity of the primary competition on the selection process rather than whether both the character and the policy preferences of candidates can be signaled in the equilibrium.

<sup>6</sup>A similar idea called "primary bonus" hypothesis is discussed in Carey and Polga-Hecimovich [2006], according to which primary voters have superior ability to identify candidates with broad electoral appeal as compared to party insiders.

nounced by candidates at the beginning of primaries represent binding commitment and will be implemented once a given candidate is elected (see Coleman [1972], Aranson and Ordeshook [1972], Serra [2006], and Owen and Grofman [2006]<sup>7</sup>). The necessity to compete in a partisan primary works as a centrifugal force that pushes office-seeking candidates away from the centrist positions that benefit them in the general election. The second line studies the sequential nature of the primary election, in which voters in some states cast their ballots well in advance of voters in other states (see Strumpf [2001] and Callander [2007]). These models focus on how later voters react to the choices of the earlier voters, and investigate when and why a momentum in voting behavior is observed and bandwagons originate. For an experimental study of the bandwagon effect of the sequential primaries see Morton and Williams [1999] and [2001].

There is a relatively new strand in the literature that allows candidates to remain ambiguous during the primary competition (see Alesina and Holden [2008] and Meirowitz [2005]). The advantage of being ambiguous is retaining flexibility about policy choice in the general election, which benefits the candidate because at the time of the primary race the position of the opposing candidate is unknown (as in Alesina and Holden [2008]) or the preferences of the voters are unknown (as in Meirowitz [2005]<sup>8</sup>). The focus of these papers is very different from ours, as they aim to explain why candidates may remain ambiguous in the primary election. For another paper on ambiguity see Aragonés and Postlewaite [2002] and references mentioned there.

Finally, one more feature distinguishes our model from the other two-stage models of elections studied in the literature. Most of the models share one common prediction: primaries turn out to be uninteresting in the sense that in the equilibrium, symmetric ex-ante primary candidates are indistinguishable (see for example Meirowitz [2005], Serra [2005] and Adams and Merrill [2008]). In our model, candidates are symmetric as well; ex-ante, each candidate is equally likely to be liberal or moderate. In spite of that, primaries are full of action, as different sequences of signals are observed from different candidates during the primary campaign.

Our paper also relates to the empirical literature that studies what factors determine the positions taken by the elected candidates: state and candidate characteristics are studied in Abramowitz [1988]; different formats of primary elections (closed, semi-closed and open) are examined in Gerber and Morton [1998]; district preferences are considered in Ansolabehere, Snyder and Stewart [2001], and competitiveness of a district is explored in King [2003]. Our paper studies a different characteristic that affects the selection of candidates, an intensity of each stage of the electoral process. Moreover, our paper also contributes to the experimental literature that studies mechanisms underlying behavior of candidates and voters in the spatial models of elections. For an excellent survey of experimental literature on elections and candidate competition, see section 3 in Palfrey [2005].

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<sup>7</sup>In Coleman [1972] parties are forward looking and behave strategically, however, candidates are irrational and do not plan beyond primaries. In Aranson and Ordeshook [1972] each party decides myopically in primaries without considering the consequences of this choices for the second stage, and candidates blindly adopt the platform imposed by the party. Serra [2006] considers the framework in which voters are forward-looking. Owen and Grofman [2006] extend Coleman's model and provide conditions under which an incumbent with a fixed policy position is likely to be re-elected when an opposing candidate must first win the primaries before competing in the general elections.

<sup>8</sup>Meirowitz [2005] shows that a primary election offers voters an opportunity to signal their preferences to candidates before they commit to policy platforms in a general election.

## 2 Setup

We build upon the standard Hotelling-Downs one-dimensional policy location game (see Hotelling [1929] and Downs [1957]). A policy space is the closed interval  $\mathbf{P} = [-1, P]$ . There is a continuum of risk-neutral voters, each with single-peaked and symmetric policy preferences on  $\mathbf{P}$ . A voter is identified by his ideal point  $z_i \in \mathbf{P}$ . We denote by  $u(z_i, p)$  the utility of a voter  $z_i$  if policy  $p$  is implemented and assume that  $u(z_i, p) = -|z_i - p|$ . A voter's ideal point is drawn from a uniform distribution  $U[-1, P]$ , with median voter denoted by  $m^{\text{pop}}$ . We assume that the position of the most conservative voter  $z_i = P$  is not known for sure,  $P \sim U[1 - 2a, 1 + 2a]$  where  $a \in [0, 1]$ . This translates into an uncertainty about the median voter  $m^{\text{pop}} \sim U[-a, a]$  with  $Em^{\text{pop}} = 0$ .<sup>9</sup>

There are two Democratic Party candidates  $j = A, B$  that compete for the office. Winning the office requires winning both the nomination (primary stage) and the general election stage - during which the winner of the primary stage challenges the incumbent. Each candidate  $j = A, B$  is equally likely to be liberal type  $t^j = L$  or moderate type  $t^j = M$ , where  $L < M$ . Candidate's type is determined by nature and is candidate's private information.

*During the primary stage*, the candidates compete by choosing a platform, which represents the probability distribution over positions  $L$  and  $M$ . Voters do not observe directly the platforms chosen by the candidates, but rather  $m$  signals randomly drawn from the platform of each candidate. Platforms of the candidates represent how strongly a candidate emphasizes positions  $L$  and  $M$  during his campaign. The more weight a candidate puts on position  $L$ , the more he will stress issues that appeal to the base of the Democratic Party, and a random draw from this platform is more likely to be an  $L$  signal. On the contrary, the more weight he puts on position  $M$ , the more often a candidate will raise issues that are close to the hearts of moderate voters and, hence, will sound like a moderate. It is the politician (and his team) that decides which topics to prioritize during main speeches and which ones to put in aside.<sup>10</sup> The number of signals  $m$  that voters observe during the primary competition measures the number of public appearances of a candidate (main speeches, debates) with each event providing one signal about the true position of a candidate. The bigger the  $m$ , the higher the intensity of primary competition.<sup>11</sup>

Only voters that belong to the Democratic Party,  $z_i \in [-1, 0]$ , vote during the primary election. A candidate that obtains a majority of votes wins the nomination and challenges a Republican incumbent in the general election. Position of the incumbent  $R$  is assumed to be known, because he has already served one term prior to the current election.<sup>12</sup>

*During the general election stage*, the challenger again chooses a platform (possibly a different one)

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<sup>9</sup>Assumption about the uncertain location of the median voter is very common in the literature (see Wittman [1983], Alesina [1988], and Alesina and Rosenthal [2000]).

<sup>10</sup>For instance, in the recent primary campaign, President Obama expressed firm intention of renegotiating NAFTA. However, there was not much talk about that issue during the general election campaign. Why is it the case? Presumably, the topic of NAFTA regulations appeals more to the Democratic base, which is the decisive force in the primary stage, than to the moderate voters during the general election stage.

<sup>11</sup>Intensity of the electoral competition can be defined in a number of ways. In this paper we take it as an exogenous parameter, that candidates have no impact on. Thus, intensity of the primary and the general election stage represent merely the number of signals observed by voters during the campaign period.

<sup>12</sup>We can assume that position of the incumbent is "more or less" known, that is  $\tilde{R} \sim R[R', R'']$  with  $E\tilde{R} = R$ . As long as voters are risk-neutral this does not add anything to the analysis.

and  $k$  signals randomly drawn from this platform and observed by the voters. As before, the number of signals  $k$  is an exogenously determined parameter which measures the intensity of the general election: the bigger the  $k$  the higher the intensity of general election. All voters,  $z_i \in \mathbf{P}$ , vote in the general election. The winner of the general election, determined by a majority of votes, implements his preferred policy - point in the policy space of his choice. That is, at the end of the game, one of the three policies  $L$ ,  $M$  or  $R$  is implemented where  $-\frac{1}{2} \leq L < M \leq 0 \leq R$ .

The platform of candidate  $j$  with type  $t^j$  in the primary race is denoted by  $plat_1^{t^j}$  and the platform of the challenger in the general election stage is denoted by  $plat_2^{t^j}$ . We will use the following shortcut  $(1 - w, w)$  to denote the platform with the weight  $1 - w$  on position  $L$  and the weight  $w$  on position  $M$ . Each candidate derives utility normalized to 1 from winning the general election and implementing his preferred policy and 0 from losing the election at either stage.<sup>13</sup>

In addition, each candidate incurs the cost of misrepresenting his private information every time he does so. These costs arise for various reasons. First, they can be interpreted as psychological costs of lying. The behavioral psychology literature indicates that people experience emotional discomfort when lying (see Ekman [1973]). Moreover, recent experimental work of Gneezy [2005], Hurkens and Kartik [2008], and Sanchez-Pages and Vorsatz [2006] shows that people have an intrinsic aversion to lying, even when messages are purely cheap talk. Second, misrepresenting the truth might require costly actions of constructing a coherent platform that stresses issues that are not the candidate's priorities as well as preparing to support such an assumed stance.

We assume that a candidate that runs on a platform that misrepresents his true type bears convex costs.<sup>14</sup> Candidate  $j$  with type  $t^j = M$  that runs on a platform  $(1 - w, w)$  pays the cost of  $(1 - w)^s$ , while candidate  $j$  with type  $t^j = L$  that runs on a platform  $(1 - w, w)$  pays the cost of  $w^s$ , where  $s$  is a positive integer and  $s \geq 2$ .

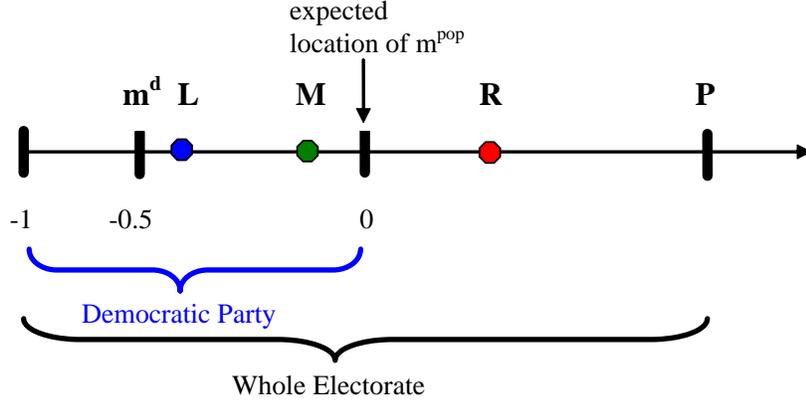
Figure 1 summarizes graphically the topography of the electoral game we study in this paper.

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<sup>13</sup>Alternatively, we can assume that the Democratic candidate gets utility of 1 if he wins elections and implements his preferred policy, utility of  $\tau^M$  or  $\tau^L$  if the Democratic candidate with the other type wins the election and, finally, utility of 0 if the Republican wins. This does not change significantly the analysis. In particular, the only change that occurs in the model is the indifference condition for the moderate type that determines how much he lies in the primary stage.

<sup>14</sup>Convex costs of lying are also used in Kartik [2008] who studies the model of strategic information transmission in which the Sender bears the cost of lying, as well as in Deneckere and Severinov [2007] who study mechanism design and screening in settings where agents incur the costs of misreporting the truth. Several papers that study electoral competition also introduce costs of misreporting private information (see Banks [1990] and Calander and Wilkie [2007]). However, the interpretation given to the costs of lying in those papers is different from ours. Both Banks [1990] and Calander and Wilkie [2007] assume that only the winning candidate bears the costs between "what he said" and "what he did" because voters can only observe true type of the candidate that has won elections. In our setting, costs are incurred *during* the election campaign (before the winner is determined) and they are incurred by *all* candidates that misrepresent their private information, as in an all-pay auction. Existence of these costs is what makes this model a signaling model rather than cheap-talk model.

Figure 1: Political spectrum



*Order of moves:*

1. **Information stage:** Each candidate  $j = A, B$  privately learns his type.
2. **Primary stage:**
  - (a) Democratic candidates choose their platforms:  $plat_1^j$  for  $j = A, B$ .
  - (b) All voters observe a sample of  $m$  signals from each candidate and form their beliefs about true types of candidates.
  - (c) Voters that belong to the Democratic Party vote for one of the candidates. The winner of a primary, determined by a majority of votes, continues the race in the next stage and will be called challenger from that moment on.
3. **General election stage:**
  - (a) Challenger chooses a platform again to run on in the general election:  $plat_2^j$ .
  - (b) All voters observe  $k$  random signals drawn from challenger's platform and update their beliefs about his true type.
  - (c) All voters cast a ballot for either challenger or the incumbent. The winner is determined by a majority of votes.
4. **Results stage:** Elected official implements his preferred policy and payoffs are determined.

Two-stage electoral game described above is characterized by the following set of exogenous parameters:  $m$  and  $k$  represent the intensities of the primary and the general election stages;  $s$  is the cost of lying for the candidates;  $L$ ,  $M$  and  $R$  capture the spatial locations of the candidates (types); and, finally,  $a$  reflects the uncertainty about the median voter in the general election.

We will denote the voters' beliefs as follows: for  $j = A, B$ ,  $p_0^j$  is the prior belief that candidate  $j$  has type  $t^j = M$ ;  $p_1^j$  is the probability that candidate  $j$  has type  $t^j = M$  after observing sequence of  $m$  messages during the primary stage; and, finally,  $p_2$  is the probability that the challenger has type  $M$  after observing sequence of  $k$  messages during the general election campaign for a given belief

$p_1$  which was formed after the primary competition. Notice that all relevant information about candidate  $j$  after the primary stage is summarized by the belief  $p_1^j$ . Therefore, voters do not need to remember all signals observed in the primary stage; they only need to remember the updated posterior belief  $p_1^j$ , which incorporates everything that happened in the primary.

Given the notation above we can define the probability of a challenger winning a seat as a function  $f(p_2)$ :

$$f(p_2) = f_0 + f_1 \cdot p_2 \text{ where } f_0 = \frac{R + L + 2a}{4a} \text{ and } f_1 = \frac{M - L}{4a}$$

We will assume that  $0 < f(0) = f_0 < f(1) = f_0 + f_1 < 1$ , that is, the result of the general election is never a certain event no matter how much information was revealed during the election process.<sup>15</sup> The fact that  $M > L$  guarantees that the function  $f(p_2)$  is strictly increasing in  $p_2$ . In other words, a challenger with a higher chance of being a moderate type (being closer to the expected median voter) has a higher chance to win a general election. Thus, given an uncertainty parameter  $a$ ,  $(L, M, R)$  should satisfy the following conditions:  $-\frac{1}{2} \leq L < M \leq 0 \leq R$  and  $-2a - L < R < 2a - M$ .

Figure 2: Probability to win the general election for a given belief  $p_2$

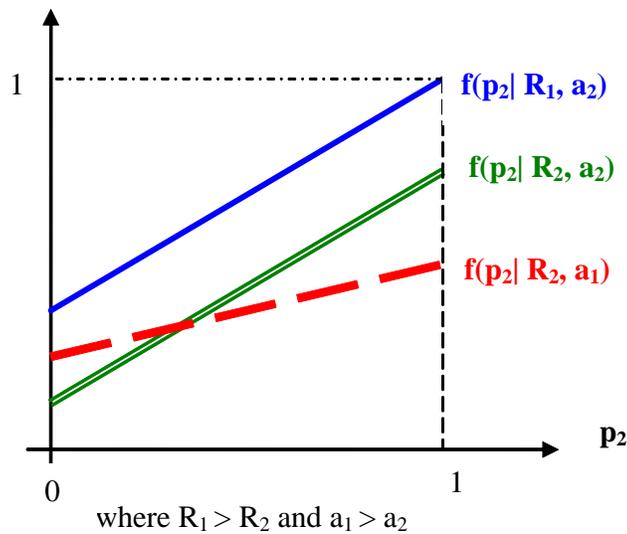


Figure 2 shows two main determinants of the function  $f(p_2)$ , which are the uncertainty parameter  $a$  and the location of incumbent  $R$ . Parameter  $a$  determines the slope of the function  $f(p_2)$ : the bigger  $a$  is, the smaller the slope. In other words, when uncertainty about the location of a median voter in a general election is relatively big, challengers of both liberal and moderate types have a similar chance of winning the general election (probability of winning the general election increases very little with the change in the type of challenger). On the contrary, if the location of the median voter is more or less known, a small increase in the beliefs of voters makes a significant difference in terms of probability of winning. The second parameter is the location of an incumbent,  $R$ . The role of  $R$  is to determine the probability that a liberal challenger will win the election given that he

<sup>15</sup>Even a challenger that has revealed himself as the liberal type ( $p_2 = 0$ ) has a strictly positive chance of winning the general election, that is,  $f(0) > 0$ . Even a challenger that has revealed himself as the moderate type ( $p_2 = 1$ ) may lose the election with positive probability, that is,  $f(1) < 1$ .

reveals himself as a liberal type during the election process: for a fixed  $L$  and  $M$  the bigger  $R$  is, the more likely a liberal challenger is to win elections (parallel shift of  $f(p_2)$  up). Put differently, the further away from zero  $R$  is, the more conservative he is. The location of  $R$  will play a significant role in the welfare analysis (section 4).

## 2.1 Equilibrium Concept

To analyze the outcomes of two-stage electoral games we will use the concept of sequential equilibrium due to Kreps and Wilson [1982]. We will concentrate our attention on the **symmetric sequential equilibria** with respect to the candidates; that is, sequential equilibria in which names of the candidates are irrelevant (the same type of both candidates  $j = A, B$  employs the same strategy at each stage of the game). The objects of symmetric sequential equilibrium are the strategy of each type of candidate in the primary stage ( $plat_1^L, plat_1^M$ ), the strategy of the challenger in the general election stage ( $plat_2^L, plat_2^M$ ), the system of beliefs of voters ( $p_0, p_1, p_2$ ), and the voting behavior at each stage, so that after every history, the strategies of each type of candidate and of voters are sequentially rational, given that the system of beliefs and the beliefs are consistent with the strategy profile (both on and off-the-equilibrium path).<sup>16</sup>

Voters use Bayes rule to update their beliefs about the type of a candidate. We assume that voters use weakly dominant strategies in each stage and abstention is not allowed. Put differently, the voter that has a strict preference for one of the candidates necessarily votes for him and the voter that is indifferent towards the two candidates randomizes equally. Notice that during the primary election, voters of the Democratic Party must take into account not only the policy the challenger will implement once elected, but also the probability that the challenger will actually win the election. This is the basic trade-off that voters face in the two-stage elections, which is crucially missing from the one-stage election models.<sup>17</sup>

## 3 Pandering equilibrium

In this section we present the main result of the paper - a **pandering equilibrium (PE)** hereafter), in which candidates pander to the median voter of the Democratic Party during primaries and shift to the center during general elections. The driving force behind this equilibrium is the need to appeal to populations with different preferences in the primary and in the general election, with the median Democrat located to the left of the median voter of the entire population.<sup>18</sup>

We will start by stating the full characterization of **PE** and two necessary conditions for its existence and then discuss the main steps of the solution.

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<sup>16</sup>We will write  $plat_k^L$  and  $plat_k^M$  instead of  $plat_k^{t^j=L}$  and  $plat_k^{t^j=M}$  for  $k = 1, 2$  and  $j = A, B$ .

<sup>17</sup>Notice that in our setting, pandering equilibrium occurs in spite of the fact that voters are forward-looking. Many scholars have explained this pandering strategy by assuming that primary voters are myopic. The assumption of myopic primary voters would only increase the effect, but the interesting feature of the model is that sophisticated voters in a primary might elect someone who is extremist despite their concerns that an extremist has a smaller chance of winning an election.

<sup>18</sup>This is in contrast with dynamic models of reputation, in which in every period, it is the same type that is beneficial: high reputation or good quality (see for example Bar-Isaac [2003]).

**MAIN RESULT.** If intensity of the primary is not too big  $m < s$  and uncertainty about the general election is not too small  $a > -L$ , then there exists a pandering equilibrium (PE) of the two-stage election game, in which in the primary stage both candidates play  $plat_1^L = (1, 0)$  and  $plat_1^M = (y, 1 - y)$  where  $y \in (0, 1)$ . After observing a sample of  $m$  messages from candidates' platforms voters update their beliefs regarding candidates' types:  $p_1^j = \frac{y^m}{y^m + 1}$  if all messages of candidate  $j = A, B$  were  $L$  and  $p_1^j = 0$  if at least one message was  $M$ . If both candidate have the same posterior beliefs  $p_1^A = p_1^B$  then each candidate  $j = A, B$  wins the primary stage with equal probability, whereas if  $p_1^A \in (0, 1)$  and  $p_1^B = 1$  then candidate  $A$  wins the nomination for sure. In the general election stage a moderate challenger plays  $plat_2^M = (0, 1)$  and the of a liberal challenger depends on the intensity of the general election: if  $k < s$  then  $plat_2^L = (1 - x, x)$  where  $x \in (0, 1)$ , otherwise  $plat_2^L = (1, 0)$ .

Note that there are two necessary conditions for the existence of **PE**. First condition,  $m < s$ , guarantees that a moderate candidate wants to mimic the behavior of a liberal one in the primary race, by putting a positive weight on the  $L$  position. Second condition,  $a > -L$ , ensures that the probability of winning the general election function  $f(p_2)$  is not too steep, and thus the majority of Democrats support a candidate with unknown type over the definitely moderate candidate in the primary election.

Similar to most sequential-move games, we solve this election game backwards, starting from the general election stage and working towards the primary stage once the solution of the second stage is determined for any possible scenario. The next three subsections present three steps of the solution: behavior of a challenger in the general election stage in any sub-game, behavior of voters in the primary stage; and behavior of candidates in the primary stage. All the proofs are presented in appendix "Pandering equilibrium - proofs."

### 3.1 Behavior of candidates in the general election

In this subsection we discuss the behavior of the challenger in the general election stage in any sub-game, which is characterized by the voters' belief regarding the type of a challenger after primaries  $p_1$ . Recall that  $p_1$  denotes the probability that the challenger has a moderate type.

If the challenger's type was revealed during the primary, which happens if voters observe at least one  $M$  message from his platform, then nothing can be gained by lying in the general election; therefore,  $plat_2^L|_{p_1=0} = (1, 0)$  and  $plat_2^M|_{p_1=1} = (0, 1)$ . A less obvious situation is the one in which voters are unsure of the type of the challenger after primaries,  $p_1 \in (0, 1)$ . Given  $plat_2^L|_{p_1 \in (0,1)} = (1 - w, w)$  where  $w \in [0, 1)$ , the best response of the moderate challenger is to announce his true type,  $plat_2^M|_{p_1 \in (0,1)} = (0, 1)$ .<sup>19</sup> In such case, liberal challenger will partially (since it is costly) mimic the moderate one in order to increase his chances of winning the general election.

**Proposition 1.** *If the intensity of the general election stage is big ( $k \geq s$ ) then a unique continuation strategy of both types of challenger is  $plat_2^M = (0, 1)$  and  $plat_2^L = (1, 0)$ , whereas if the intensity of the general election is not so big ( $k < s$ ) then a unique continuation strategy of both types of challengers is  $plat_2^M = (0, 1)$  and  $plat_2^L = (1 - x, x)$ , where  $p_1 \in (0, 1)$  is the posterior belief regarding the type of the challenger after the primary stage and  $x \in (0, 1)$  solves  $x^{s-k} = \frac{kf_1}{s} \cdot \frac{p_1}{p_1 + (1-p_1)x^k}$*

<sup>19</sup>To see that there is no equilibrium, in which  $plat_2^L|_{p_1 \in (0,1)} = (0, 1)$ , notice that the cost of playing  $plat_2^L = (0, 1)$  is 1 which is more than the potential benefit, since no candidate wins the election with certainty.

An important determinant of the behavior of a liberal challenger in the second stage is the belief  $p_1$  which summarizes all the relevant information from the primary stage.

**Corollary 1.** *If  $k < s$  then  $x(p_1)$  is an increasing function of  $p_1$ .*

That is, a liberal challenger shifts to the center more in the general election when belief  $p_1$  regarding his type is higher. The intuition of this result is the following. Consider the case in which a liberal challenger has won the primary with a very small  $p_1$ . That is, voters are quite sure that the challenger is a liberal type. Therefore, the challenger will have a hard time convincing voters that he is actually not that liberal, and, since doing so is costly, a liberal challenger will put less effort in pretending to be a moderate type during the general election campaign. So, on the one hand, when  $p_1$  is very small, this seems to be a good thing because the primary competition resolved a lot of uncertainty about the type of the challenger (initial belief was  $p_0 = \frac{1}{2}$ ). However, this also has consequence for the continuation of the game. A liberal challenger with a small  $p_1$  will lose the general election more often because he will often be detected as a liberal one. On the contrary, if  $p_1$  is close to the initial belief  $\frac{1}{2}$ , then there is a lot of uncertainty left about the true type of challenger, in which case the liberal challenger has incentive to misrepresent his true position in order to increase his chances of winning election.

### 3.2 Behavior of voters in the primary election

Now that we know what happens in the general election stage for any possible scenario, we can turn to the primary stage. In this section we will derive the behavior of Democratic voters in the primary election and provide one of the necessary conditions for the existence of **PE**.

**Proposition 2.** *For  $a > -L$ , if  $p_1^j \in (0, 1)$  and  $p_1^k = 1$  then candidate  $j$  wins the primary against candidate  $k$ , where  $j, k \in \{A, B\}$  and  $j \neq k$ .*

First thing to notice is that the assumption of risk-neutrality simplifies the solution for the behavior of voters in the primary stage because all Democrats who are more extreme than the median Democrat,  $z_i < m^{\text{Dem}} = -\frac{1}{2}$ , will vote for the same candidate during the primary as the median Democrat does. Moreover, the main trade-off that Democrats face in the primary stage is the following one: a more liberal candidate is closer to their ideal points, but has a smaller chance of winning the general election. When uncertainty about  $m^{\text{pop}}$  is big enough, the second consideration becomes less important, because the probability to win the general election function  $f(\cdot)$  is relatively flat.

### 3.3 Behavior of candidates in the primary stage

Finally, given the behavior of voters in the primary stage and that of candidates in the general election in any possible sub-game, we can obtain an optimal behavior of candidates in the primary. In this section, we will also specify the second necessary condition for the existence of **PE**.

**Proposition 3.** *If  $m < s$  and  $a > -L$ , then there exists a unique  $y \in (0, 1)$  such that  $\text{plat}_1^L = (1, 0)$  and  $\text{plat}_1^M = (y, 1 - y)$  is an optimal behavior of candidates in the primary stage.*

As we have seen in section 3.1 the behavior of the liberal challenger in the general election depends on the intensity of the general election stage. Therefore, we distinguish two cases:

- When intensity of the general election is big,  $k \geq s$ , there exists a **PE** in which in the primary stage candidates play  $plat_1^L = (1, 0)$  and  $plat_1^M = (y, 1 - y)$  where  $\frac{s}{m}y^{s-m} = \frac{f_0+f_1}{2}$  and in the general election stage challengers of both types separate by playing  $plat_1^L = (1, 0)$  and  $plat_2^M = (0, 1)$ .
- When intensity of the general election stage not so big,  $k < s$ , there exists a **PE** in which in the primary stage candidates play  $plat_1^L = (1, 0)$  and  $plat_1^M = (y, 1 - y)$  and in the general election stage the moderate challenger plays  $plat_1^M = (0, 1)$  and the liberal challenger plays  $plat_2^L = (1 - x, x)$  where  $(x, y) \in (0, 1) \times (0, 1)$  are determined by the system below:

$$\begin{cases} \frac{s}{m}y^{s-m} = \frac{f_0+f_1}{2} - \frac{f_1}{4} \cdot \frac{x^k(3-y^m)}{x^k+y^m} \\ \frac{s}{k}x^{s-k} = f_1 \cdot \frac{y^m}{y^m+x^k} \end{cases}$$

### 3.4 Comparative statics

Now that we have characterized the main result of the paper, **PE**, the rest of the paper studies the properties of this equilibrium. In particular, we investigate the impact of the change in the intensities of the primary and general election stages on the behavior of candidates in **PE** and show both theoretically and empirically, how these changes affect the selection of candidates and implemented policies.

We will start by demonstrating how the optimal behavior of candidates in **PE** changes with the change in number of signals observed in the primary and general election campaigns ( $m$  and  $k$ ). These two effects, change in  $m$  and change in  $k$ , are in the core of the analysis, as they are the main driving force behind most of the implications of **PE**. All the proofs are presented in appendix "Pandering equilibrium - proofs."

**Proposition 4.** *For small  $k$  ( $k < s$ )  $\frac{\partial y}{\partial k} > 0$  and  $\frac{\partial x^k}{\partial k} < 0$*

Put in words, the higher the intensity of the general election stage the more a moderate candidate is willing to lie in the primary stage and the more often a liberal challenger is revealed as a liberal type during the general election stage. The intuition behind the result is the following: when the intensity of the general election is high, voters get more signals from the platforms of candidates and, therefore, a liberal challenger is likely to send at least one  $L$  signal, which immediately and fully reveals him as a liberal type. Therefore, a moderate challenger who never sends an  $L$  message, has a higher chance of winning the election if he gets to the general election stage. This is why a moderate candidate is willing to incur more costs at the primary stage to mimic a liberal candidate and increase his chance of winning the nomination. For large  $k$  ( $k \geq s$ ), a change in  $k$  does not impact behavior of candidates in **PE**, because both types separate in the general election stage, and, thus, optimal lie of a moderate candidate in primaries does not depend on  $k$ .

**Proposition 5.**  *$\frac{\partial y^m}{\partial m} < 0$  and for small  $k$  ( $k < s$ )  $\frac{\partial x}{\partial m} < 0$*

Put in words, the higher the intensity of the primary race the harder it is for a moderate candidate to pretend to be a liberal type during the primary competition, because it is more likely that at

least one message will turn out to be an  $L$  message and, thus, the type of a moderate candidate will be completely revealed to voters. Moreover, if a liberal challenger is willing to mimic the moderate one in the general election stage, then he will do so less when the intensity of primaries is high (for the intuition see Corollary 1).

## 4 Welfare analysis

In this section we will show how the changes in the intensity of the primary and the general election stages,  $m$  and  $k$ , affect the welfare of democrats and that of the entire population. The complete proofs are presented in appendix "Pandering equilibrium - proofs."

We will denote by  $W^{POP}(p)$  and  $W^{DEM}(p)$  the welfare of the whole population and that of Democrats when policy  $p$  is implemented. Total expected welfare of the whole population ( $EW^{POP}$ ) and that of Democrats ( $EW^{DEM}$ ) also takes into account the probability of each type to win the election:

$$\begin{aligned} EW^{POP} &= \Pr[L \text{ wins}] \cdot W^{POP}(L) + \Pr[M \text{ wins}] \cdot W^{POP}(M) + \Pr[R \text{ wins}] \cdot W^{POP}(R) \\ EW^{DEM} &= \Pr[L \text{ wins}] \cdot W^{DEM}(L) + \Pr[M \text{ wins}] \cdot W^{DEM}(M) + \Pr[R \text{ wins}] \cdot W^{DEM}(R) \end{aligned}$$

where

$$W^{POP}(p) = \int_{1-2a}^{1+2a} \left( \int_{-1}^P -\frac{|z_i - p|}{P+1} dz_i \right) \frac{1}{4a} dP \text{ and } W^{DEM}(p) = \int_{1-2a}^{1+2a} \left( \int_{-1}^0 -\frac{|z_i - p|}{P+1} dz_i \right) \frac{1}{4a} dP$$

and  $p$  denotes an implemented policy. Democrats as a party like it the most when liberal type  $L$  wins the election and the least when the incumbent  $R$  wins, that is,

$$W^{DEM}(L) > W^{DEM}(M) > W^{DEM}(R)$$

The analysis in this section is restricted to the situation, in which the welfare of the entire population is higher when a moderate candidate wins the election than when a liberal one does,  $W^{POP}(M) > W^{POP}(L)$ , which is guaranteed by the condition  $M < \min[\phi - L, 0]$  where  $\phi = \frac{4a}{\log \frac{1+a}{1-a}} - 2$ .<sup>20</sup> Under this condition, the ranking of all three outcomes depends on the location of the incumbent:

- if  $R$  is centrist,  $R < R'$ , then  $W^{POP}(R) > W^{POP}(M) > W^{POP}(L)$
- if  $R$  is conservative,  $R \in (R', R'')$ , then  $W^{POP}(M) > W^{POP}(R) > W^{POP}(L)$
- if  $R$  is very conservative,  $R > R''$ , then  $W^{POP}(M) > W^{POP}(L) > W^{POP}(R)$  where  $R' = \phi - M$  and  $R'' = \phi - L$ .

Given an optimal behavior of candidates in **PE** characterized in section 3, we can write down the probability of each type winning the election:

$$\Pr[L \text{ wins election}] = \frac{3 - y^m}{4} \left[ f_0 + f_1 x^k \frac{y^m}{y^m + x^k} \right]$$

<sup>20</sup>This restriction is a natural one in light of the pandering equilibrium, which we study in this paper. Put differently, a moderate type  $M$  is not only closer to the expected location of the median voter in the general election than an  $L$  type, but it also brings the society as a whole a higher utility compared with an  $L$  type.

$$\Pr[M \text{ wins election}] = \frac{(1 - y^m)^2}{4}(f_0 + f_1) + \frac{(3 - y^m)y^m}{4} \left( f_0 + f_1 \frac{y^m}{y^m + x^k} \right)$$

$$\Pr[R \text{ wins election}] = 1 - \Pr[L \text{ wins}] - \Pr[M \text{ wins}] = 1 - f_0 - \frac{f_1}{4} \cdot (1 + y^m)$$

We are now ready to state what happens with the welfare of the entire population, when there is an increase in the intensity of the general election stage.

**Proposition 6.** *For  $k < s$  and  $R > R'$ , an increase in the intensity of the general election increases the welfare of the whole population,  $\frac{\partial EW^{POP}}{\partial k} > 0$ .*

The proof is based on showing how the increase in the intensity of the general election affects the probability of each type to win the election. Using the comparative static results reported in section 3.4, we show that an increase in number of signals observed in the general election campaign makes a moderate type win an election more often and other types ( $L$  and  $R$ ) lose more often. Therefore, the whole population benefits from the intense general elections because  $W^{POP}(M) > \max [W^{POP}(L), W^{POP}(R)]$  for  $R + M > 0$ .

The next proposition describes the effect of the increase in the intensity of the primary race on the welfare of Democrats and that of the whole population for large  $k$ .

**Proposition 7.** *For  $k \geq s$  and  $R > R'$ , the whole population suffers from the intense primaries,  $\frac{\partial EW^{POP}}{\partial m} < 0$ . For  $k \geq s$ , Democrats benefit (suffer) from the intense primaries if the incumbent is not very conservative (very conservative),  $\frac{\partial EW^{DEM}}{\partial m} \geq 0$  if and only if  $R \leq \bar{R}$ .*

Intuitively, when many signals are observed during the primary race, moderate candidates lose the nomination more often. Thus, the whole population suffers from intense primaries, because the moderate candidate winning the election is the most preferred outcome for the entire population when the incumbent is not too centrist ( $R > R'$ ). What about the welfare of Democrats? There are two contrasting effects that jointly determine what happens with the welfare of the Democrats. Intense primaries make an incumbent win more often (instead of the moderate type), which is bad for Democrats. However, the liberal candidates are elected more often, which is good for Democrats. When the incumbent is not very conservative ( $R < \bar{R}$ ), the latter positive effect outweighs the former negative one, because Democrats do not lose much from the fact that the incumbent is elected. On the contrary, when the incumbent is very conservative, the negative effect dominates the positive one, and democrats suffer from intense primaries, as does the population as a whole.

## 5 Evidence from the field

In this section we take pandering equilibrium characterized in section 3 to an empirical test. More precisely, we discuss three testable implications of **PE** and present data from US congressional and presidential elections that supports them.

### 5.1 Observation 1

The first effect is called "divisive primary" hypothesis (DPH). It states that a hard-fought primary battle is detrimental to a party's chances to win the election. That is, when the nomination process

is intense, Democrats lose elections more often:

$$\Pr[L \text{ wins}] + \Pr[M \text{ wins}] = f_0 + f_1 \cdot \frac{1 + y^m}{4} \Rightarrow \frac{\partial (\Pr[L \text{ wins}] + \Pr[M \text{ wins}])}{\partial m} < 0$$

Notice the intuition behind this result. As the number of signals in the primary grows, so does the chance that the moderate type will send at least one  $M$  message, that would fully reveal his type. Thus, he will lose the nomination more often. In addition, when the general election is not too intense the "shift to the center" performed by the liberal challenger in the general election stage is smaller, which means that he loses the election more often. Both effects contribute to the overall decrease of Democrats' chances to win the election when primaries are intense.

To check the robustness of DPH, we extended the model studied here to the situation in which both parties conduct a primary election to select candidates for the general election stage, in which voters observe many signals from candidates' platforms,  $k \geq s$ . In appendix "DPH," we demonstrate that this extended model has a unique **PE**, in which moderate candidates pander towards their party bases during the primary and shift to the center once the nomination is secured. Moreover, we show that an increase in the intensity of a Republican primary is beneficial to the Democratic party as the chances of Republicans winning the election decrease.<sup>21</sup>

There is a large empirical literature that investigates the validity of DPH in all major political offices in the last 50 years. For studies of gubernatorial elections see Kenney and Rice [1984]; for studies of senatorial elections see Hacker [1965], Bernstein [1977], and Kenney and Rice [1984]; House races are studied in Born [1981], while Kenney and Rice [1988], Lengle [1980], Lengle, Owen and Sonner [1995], and Atkenson [1998] examine the effect of divisive primaries on the general election outcomes in presidential elections. Most of the studies support the DPH hypothesis with the most conclusive evidence seen in the presidential races.

While some debate exists about the magnitude of the DPH, the consensus about its theoretical rationale seems more unanimous. Most scholars agree that the mechanism underlying the DPH comes from the social psychology literature that suggests that the followers of a losing candidate develop a psychological attachment to him (Kenney and Rice [1987] and Sullivan [1978]) or become angry at the winning candidate (Southwell [1986]) and find it impossible to support the party nominee in the general elections.<sup>22</sup> Note that this explanation contradicts the rationality of the voters. By abstaining from voting in the general election, voters that supported the loser of the primary race may hurt themselves even more because the alternative (candidate from another party winning the seat) is much worse.

It is worth noting at this point that all studies that document DPH use aggregate voter turnout data to estimate the effect of competition in primaries on the general election outcomes. However,

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<sup>21</sup>Two effects contribute to this result. First effect is the same as in the basic model: when Republican primaries are intense, a moderate Republican candidate has a smaller chance to win the nomination. In addition, there is a new effect according to which a moderate Democrat mimics the liberal type more aggressively during the nomination stage because he knows he has a higher chance to win the general election than when Republican primaries are not intense.

<sup>22</sup>The exception to the conventional wisdom are a few papers that suggest that the presence of an external threat – another party's candidate becoming President – minimizes the effect of a divisive primary as voters are brought back into the fold (see the summary of Alan Ware [1979]). The small group studies, however, have shown that this may not be the case, suggesting that people are not always able to put aside their negative feelings and reconcile their differences in the face of a greater threat (see Sherif and Sherif [1953]).

in order to establish whether the supporters of the candidate that lost the primary vote for the nominee in the general election, one would need to consider individual-level data. Studies that use such data are extremely rare in literature. Two exceptions are Buell [1986] and Culbert [2002]. Remarkably, both studies find evidence that is at odds with the "dissappointed supporters" story. Buell [1986] investigates the behavior of Democratic Party activists from New Hampshire after the 1984 primary election and finds that although activists that supported Mondale's opponents helped Mondale's fall campaign significantly less than Mondale supporters, very few of them abstained or defected to Reagan in the general election. Culbert [2002] examines the NES Super-Tuesday Panel data from the 1988 presidential elections and finds that people who initially preferred another candidate during the nomination process tend to feel better about the winning candidate (nominee) than they did before the contest. Moreover, as a primary contest becomes more competitive, voters are more likely to develop respect for the opposition in contrast to the negative feelings that are the milestone of the existing DPH explanation.

To summarize, it seems that the irrationality of voters cannot be the driving force behind DPH. My model suggests a **rational explanation** of this effect: intense primaries are the ones in which voters get to see more signals about the candidates competing in the primary stage, and, thus, are able to select a liberal candidate with higher probability; the latter, unfortunately, have a lower chance of winning the general election.

## 5.2 Observation 2

Another prominent feature of the pandering equilibrium is the negative relation between the chances of a candidate to win the primary and the general election stages. This holds true for both types of candidates: a liberal type is advantageous during the primary stage, as he has a higher chance of winning the nomination than a moderate type, while a moderate type, unlike a liberal type, is more likely to win elections once the nomination is secured.

Study of Maisel and Stone [1998] suggests that potential candidates are aware of this relation. Using the data from "Potential Candidate Survey,"<sup>23</sup> authors study potential candidates who are considering running in the House elections. Among 355 potential candidates that were identified by the Informant Survey, there were 210 candidates that believed they had some positive chance of winning the general election if they were nominated. We decompose this subset of 210 candidates into two groups: those that are *less likely* (Group1) and *more likely* (Group 2) to win the general election<sup>24</sup> and show in Table 1 the distribution of beliefs about their nomination chances.

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<sup>23</sup>This survey is drawn from the Candidate Emergence Study, which was designed to understand decision-making by those who consider a race for the House. See study by Stone and Maisel [2003] that investigates the effect of district partisanship and the quality of the incumbent and potential candidate on the chances of the latter to win the nomination and the general election.

<sup>24</sup>Potential candidates that estimated their chance of winning general elections as Toss-up (somewhat Likely - somewhat Unlikely) are in the group of less likely to win the general election. Potential candidates that estimated their chance of winning general elections as Likely or extremely Likely are in the group of more likely to win the general election.

Table 1: Beliefs of potential candidates (from Maisel and Stone [1998])

	Group 1	Group 2
Unlikely - extremely Unlikely	26%	56%
Toss-up (somewhat Likely - somewhat Unlikely)	24%	21%
Likely - extremely Likely	50%	24%
# of obs	108	102

As can be seen from Table 1, more than half of the candidates from Group 2 - 56% - estimate their chances of winning the nomination as (extremely) unlikely, while only 26% of Group 1 candidates hold the same belief. Similarly, half of the candidates from Group 1 - 50% - believe that they are (extremely) likely to win the nomination compared with only 24% of the Group 2 candidates.

Finally, we note a recent example of Senator Joe Lieberman<sup>25</sup>, who lost the nomination to Ned Lamont in the Democratic primary, and then won against the same candidate in the general election while running as an independent. Our model is consistent with this story. The loss of the primary race by Sen. Lieberman can be interpreted as an indication that he was revealed as a moderate candidate during the primary campaign, and thus lost to Ned Lamont who remained more ambiguous about his true position. However, when faced with the same opponent in the general election, he won the seat because the moderate position occupied by the Sen. Lieberman is preferred over any "more liberal" position of his opponent.

### 5.3 Observation 3

The third observation distinguishes between the effects of an intense primary and an intense general election competition on the selection of candidates. Applying our model to the US congressional elections we arrive at the following predictions:

- Districts in which the general election is more intense than in the other districts will elect more moderate legislators when the intensity of the primary is held fixed.
- On the contrary, districts in which the nomination process is more intense than in the other districts will elect more extreme legislators, if we control for the intensity of the general election.

These two hypotheses are straightforward implications of the comparative statics results discussed in section 3.4. When more signals about candidates are observed in the general election, a liberal candidate that gets to the second stage will lose more often, because at least one of his messages is likely to be an  $L$  message and this fully reveals him as the liberal. In addition, moderate candidates will mimic the liberal ones more aggressively during the primary race to secure the nomination. On the contrary, the higher the intensity of the primary, the higher the likelihood of a moderate candidate to lose the nomination and thus lose the election as a whole.<sup>26</sup>

<sup>25</sup>I thank Alessandro Gavazza for mentioning this example to me.

<sup>26</sup>It is easy to see that when  $k \geq s$  then

$$Pr[M \text{ wins}] = \frac{1 + y^m}{4} \cdot (f_0 + f_1) \Rightarrow \frac{\partial Pr[M \text{ wins}]}{\partial m} < 0$$

To assess the validity of the two hypotheses above, we used data from House races in 1998 (106<sup>th</sup> Congress). Out of 435 congressional districts, we focused on the subset of 93 districts, in which the elected politicians faced competition in both stages of the election.<sup>27</sup> To estimate legislators' positions we used first dimension of DW-NOMINATE scores developed by Poole and Rosenthal.<sup>28</sup> This measure is a common one used in the literature to place politicians in the one-dimensional "liberal-conservative" continuum. To measure the intensity of the nomination process we used the information on candidates running in the primary. An intense primary is defined as one in which no incumbent is running for re-election and there are at least two public figures running, where public figure is the candidate who had held public position prior to the election.<sup>29</sup> To measure the intensity of the general election, we used the dummy variable that records whether there is an incumbent running for re-election in this district or it is an open-seat district.

To illustrate the logic behind intensity variables, consider the following example. In the Colorado 6<sup>th</sup> congressional district the following candidates were running in the primaries: Tom Tancredo (former state representative), Bill Schroeder (state senator), Martha Hill Kreutz (state representative), Sam Zakhem (former ambassador) and Barry Arrington (state representative). We hypothesize that this primary battle is more intense (in part due to media exposure) than the one in the Nevada 1<sup>st</sup> congressional district, in which Shelley Berkley (telecommunication consultant) is running against Clay Baty (casino employer). What about the intensity of the general election stage? In 1998 congressional elections, incumbents that sought re-election did so successfully about 98.5% of the time and this year is not an exception. Overwhelming incumbency advantage is a well-documented result in the empirical literature on congressional elections.<sup>30</sup> Thus, we think that the intensity of the general election stage in the districts in which one of the competing candidates is an incumbent is small compared with the one in the open-seat districts, in which both major parties have a decent chance of winning election.

Finally, we control for differences between districts unrelated to the intensity of primary and general election competition but related to the preferences of voters in a district. These controls allow us to separate the informational component of elections from the spatial differences between districts and, thus, to distinguish the model presented here from the one, in which candidates announce a policy only once, during the primary campaign, and this announcement represents a binding com-

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When  $k < s$ , the necessary condition for Moderate type to lose elections more often when  $m$  increases is:

$$\frac{\partial \Delta}{\partial m} < -\frac{f_0}{f_1} \cdot \frac{\partial (y^m)}{\partial m} \text{ where } \Delta = \frac{y^m + y^{2m} + x^k(1 - y^m)^2}{4(x^k + y^m)}$$

<sup>27</sup>The fact that only a quarter of congressional districts elected legislators who faced both primary and general competition is consistent with the observation that congressional elections are not very competitive (see Maisel and Stone [2001]).

<sup>28</sup>For a discussion of these scores, see Poole and Rosenthal [1997] and McCarty, Poole, and Rosenthal [2006].

<sup>29</sup>Examples of public figures include state senators, state representatives, city party chair, mayor, district attorney and others. Occupation of the candidate is highly correlated with the number of times his name appears in newspapers, TV and radio broadcasts in the last three years before the election year: January 1, 1995 - January 5, 1998 (according to LEXIS-NEXIS). This measure is similar to the one used in the literature that is often referred to as political experience (see Abramowitz [1988]).

<sup>30</sup>For studies that document and investigate the reasons behind incumbency advantage see Gelman and King [1990] and references mentioned there.

mitment.<sup>31</sup> In other words, the effects that remain present after controlling for the preferences of district voters, can be attributed to the intensity of each stage of the election as described by our model and cannot be explained by the model with full commitment.

There are different measures of the preferences of the voters used in the literature. One such popular measure is called the district partisanship index (DPI). This measure captures the fraction of voters that supported the other party nominee in the presidential elections averaged over 1992, 1996 and 2000 elections. By considering only the districts in which DPI is less or equal to 0.5 we can interpret the monotonic increase in the DPI as the indicator of less extreme preferences of the voters in a given district. When DPI is close to 0 it means this district is heavily Republican or Democratic; when DPI is close to 0.5 both major parties are well-represented in the district.

Another way to control for district preferences is to measure directly preferences of Democrats and Republicans (using survey techniques, for instance) and estimate relative size of each party in a district. Clinton [2006] uses this technique to study whether the positions taken by legislators in the 106<sup>th</sup> Congress are influenced by constituencies' and sub-constituencies' preferences. His data comes from surveys conducted in 1999 and prior to the 2000 election by Knowledge Networks and the National Annenberg Election Survey (see Clinton [2006] for details about the data and how the measure of voters' preferences was constructed). Since none of the described measures is perfect, we report in Table 2 the results from four models which differ only in the controls used to isolate the effect of information from the spatial differences between districts.<sup>32</sup>

Table 2: Regression analysis.

Positions of the elected legislators are regressed on the intensity of the primary and that of the general election and control variables of a district.  
 (\* - significant at 5% and \*\* - significant at 10%)

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>
Intensity of the primary	0.139* (0.053)	0.138* (0.049)	0.126* (0.047)	0.099* (0.046)
Intensity of the general election	-0.086** (0.049)	-0.110* (0.045)	-0.097* (0.044)	-0.066** (0.039)
<i>Controls</i>				
DPI index	-0.304* (0.129)		-0.310* (0.132)	
Position of same party voters		0.082 (0.070)	0.128** (0.071)	0.028 (0.073)
Position of other party voters		0.289* (0.101)	0.226* (0.102)	0.390* (0.107)
Fraction of same party voters		0.145 (0.134)		0.297* (0.143)
Constant	0.580* (0.050)	0.384* (0.082)	0.576* (0.050)	0.384* (0.098)
# of observations	76	76	76	93
adjusted $R^2$	0.1385	0.2650	0.3077	0.3031

<sup>31</sup>In this alternative model, spatial locations of median voters of both parties and their relative size determine the optimal position for a candidate, whose goal is to maximize his chances of winning the election. In particular, this model would predict a positive correlation between constituent and candidate preferences in a district (see Ansolabehere, Snyder and Stewart [2001] and Burden [2004] for empirical evidence of it).

<sup>32</sup>If both measures of district preferences were perfect then we should expect a correlation of  $-1$  between DPI and preferences of the district that are calculated by weighing the preferences of Democrats and those of Republicans by the number of them in a given district. However, in reality the correlation is  $-0.67$  for districts represented by Democratic legislators and  $-0.63$  for the Republican ones.

Notice that no matter which controls are used, the effects of intensity of primaries and general elections reported in Table 2 are significant and robust. We find support for both hypotheses: districts with intense primaries elect more extreme legislators after controlling for the intensity of the general election, while districts with intense generals elect more moderate legislators after controlling for the intensity of primaries. How big are these effects? To answer this question we will compare the magnitude of the estimated effects with the increased polarization in the positions of Democrats and Republicans in the US congress, which are a dramatic, well-documented realm of US politics. Over the last 25 years, Democrats become 0.112 more liberal and Republicans have become 0.251 more conservative.<sup>33</sup> In light of the above fact, the magnitude of the estimated effects seems noteworthy.

We will conclude this section by noting that the stylized fact presented in this section suggests that the model of information transmission in a two-stage election process has a bite in the sense that the positions of elected politicians reflect not only the preferences of the constituencies in a district but also the intensity of the races; the latter translates into the amount of information transmitted during the primary and the general election.

## 6 Evidence from the lab

Empirical results discussed in section 5 provide support for the *implications* of the model, but cannot validate the *mechanics* of the interaction between candidates and voters, on which this model stands. Given the lack of field data that would be necessary to study the latter, we supplement our results by conducting controlled laboratory experiments, in which we assess whether voters understand the trade-offs that candidates face in two-stage elections and recognize that they should support the more liberal candidate in the primary election. In the experiment, we observe not only the behavior of the voters but also elicit, in the incentive-compatible way, voters' beliefs regarding the true types of candidates. The latter data is what makes the experimental setting so attractive, because it allows us to study the belief formation process otherwise unobserved in the field data.

### 6.1 Experimental Procedure and Design

All of the experiments were run at the laboratory of the Center for Experimental Social Science (CESS) at New York University. The subjects were recruited from the general undergraduate population of New York University. In total 57 subjects participated in the experiment, which lasted 50 minutes, and the average payoff was \$20. Subjects arrived at the lab and were assigned either the role of a candidate or the role of a voter. Then subjects were divided into groups of three, with two candidates and one voter in each group. As we will see, the voter only participated in the primary stage. Subjects were randomly allocated to a new group in each of the 20 rounds of the experiment, but they kept the same roles throughout the experiment. The identity of the participants they were paired with was not known to the subjects.

Each round was an independent election with two stages. At the beginning of each round candidates privately received a type (liberal or moderate), which was a 50 : 50 draw by the computer. Then each candidate chose a platform for the primary race, and several messages were selected from the

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<sup>33</sup>Average positions of Democratic and Republican legislators are compared between the 98<sup>th</sup> and 110<sup>th</sup> Congresses using the same DW-NOMINATE scores. See "Polarized America" for the discussion of the increase in polarization of the US Congress.

candidates' platforms and shown to all members of the group. After observing the messages of each candidate, each voter performed two tasks. First, the voter was asked to state what he/she believed was the probability that each candidate had the liberal type, and, second, to vote for one of the candidates. The candidate that received the vote won the first stage and continued to the second stage of the election, in which he had a chance to win the election (a prize).

The main focus of the experiment was on the effects of the intensity of the primary stage; therefore, we chose the parameters of the game that simplified the general election stage. More precisely, possible types of candidates were  $L = -\frac{1}{2}$  for liberal one,  $M = -\frac{1}{10}$  for moderate one and  $R = \frac{1}{2}$  for the incumbent; an uncertainty about the median voter was  $m^{\text{pop}} \sim U[-0.8, 0.8]$ , candidates incurred costs of lying  $80 \cdot \text{lie}^s$  where  $s = 8^{34}$  and the winner of the election received the prize of 50 tokens. The intensity of the general election stage was big enough,  $k > 8$ , so that candidates of both types preferred to separate in the general election. This allowed us to automate the second election stage: the type of the candidate that won the primary stage was revealed to a fictitious voter, and if he was liberal then he had a 50% chance of winning the second stage, while a moderate challenger had a 62.5% chance of winning. For the complete instructions see appendix XXX.

The voter in each group occupied the location of the median Democrat  $m^{\text{Dem}} = -\frac{1}{2}$  and had linear utility of  $u(m^{\text{Dem}}, p) = 50 - 50(p - m^{\text{Dem}})$  when policy  $p$  was implemented. As we discussed in section 3.3, the behavior of the median Democrat in the primary is decisive, since any voter who is more liberal than the median Democrat will behave as he does. Therefore, the candidate that receives the vote of the median Democrat wins the nomination. Finally, voters were also rewarded for stating their beliefs regarding the type of candidates using a quadratic scoring rule. According to this rule, voters were penalized for the mistakes made in identifying the true type of a candidate: the bigger the mistake the bigger the penalty (see Nyarko and Schotter [2002] that used the same rule to elicit subjects' beliefs). The belief elicitation task makes it possible to study not only whether the voting behavior of the voters is consistent with their beliefs but also how those beliefs are formed. Put differently, if we observe that voters behave differently from what the theory predicts, then we will be able to identify whether it is because the voting behavior is inconsistent with the beliefs in a particular way or it is the beliefs formation process that is different from the one assumed in theory. The latter distinction is what makes a controlled laboratory experiment a unique tool to study decision-making, as it allows us to obtain data unavailable outside the lab.

Notice the main trade-offs that subjects face in this game. A primary voter prefers a candidate with liberal type to win the election rather than a moderate type (payoff of 50 tokens as opposed to 30 tokens). However, a liberal type has a smaller chance of winning the general election stage than a moderate type, 50% versus 62.5%, while if an incumbent wins the election the voter receives the lowest possible payoff of 0 tokens. All in all, assuming the risk-neutrality of the voters, the latter should select a "more liberal" candidate during the primary election. A liberal candidate should always tell the truth (send only  $L$  messages) in the primary stage. This is in fact the dominant strategy for any liberal candidate.<sup>35</sup> The behavior of a moderate candidate is more complicated: a

<sup>34</sup>We picked the cost parameter to be  $s = 8$  to ensure that the optimal behavior of the moderate candidate is different enough between treatments ( $m = 1$  and  $m = 7$ ).

<sup>35</sup>By dominant strategy, we mean the following: suppose that voters believe that candidates play  $\text{plat}_1^L = (1, 0)$  and  $\text{plat}_1^M = (x, 1 - x)$  during the primary stage where  $x \in [0, 1]$ . Then neither of the candidates with liberal type has an incentive to deviate and play a different strategy. This is obvious when a moderate type puts less than 100% weight on the liberal position, which means  $x < 1$ . To see that this is also true when  $x = 1$ , we will show that a liberal type of candidate  $B$  is better off by playing  $\text{plat}_1 = (1, 0)$  when both types of candidate  $A$  play  $\text{plat}_1 = (1, 0)$

moderate type has an incentive to mimic the liberal one to increase his chances of winning the nomination by lying in the primary election. The optimal lie depends on the intensity of the primary. Theoretically, more lying should occur when primaries are less intense, because the chances that a moderate type will be detected as a moderate one increase with the number of messages observed from candidates' platforms.

We ran two treatments: a **low intensity** treatment, in which voters observe only 1 message from the candidates' platforms during the primary election and a **high intensity** treatment, in which they observe 7 messages. In both treatments, the experiment was designed in such a way that liberal candidates had no active choice in the primary election because the computer chose a platform for them that always sent  $L$  messages,  $plat_1^L = (1, 0)$ . In other words, in the primary if a candidate was randomly assigned to be an  $L$  type, he/she had no choice to make since the computer chose the degenerate platform  $plat_1^L = (1, 0)$ . All candidates and voters were aware of this restriction. As discussed above, choosing a platform  $plat_1^L = (1, 0)$  is the dominant strategy for the liberal candidates. Therefore, by forcing liberal candidates to choose their dominant strategy, we provide the simplest way to test the effects of the *intensity of the primary election* on the behavior of moderate candidates and voters, which is the main focus of this paper.<sup>36</sup>

## 6.2 Results of the experiment

We summarize the results of the experiment by means of three questions: 1) how the intensity of the primary stage affects the behavior of moderate candidates; 2) whether the way voters vote is consistent with the beliefs they hold regarding the true types of candidates; 3) how those beliefs are formed and whether the beliefs formation process depends on the intensity of the primary competition.

### 6.2.1 Behavior of moderate candidates

According to the theory, the intensity of the primary election affects the incentives of a moderate candidate to mimic the behavior of a liberal one and lie in the primary. Voters observe more signals from the candidates' platforms when the primary election is intense; therefore, we expect a moderate type to lie less in this case, because he is more likely to be detected than in the low intensity treatment. Table 3 summarizes the theoretical and observed behaviors of moderate candidates.

Table 3: Predicted and observed behavior of moderate candidates, by treatment

	Low intensity	High intensity
optimal lie of moderate candidate (theory)	58.8	17.1
observed lie (averaged) in all 20 periods	36.3	18.9
observed lie (averaged) in last 10 periods	35.9	13.9

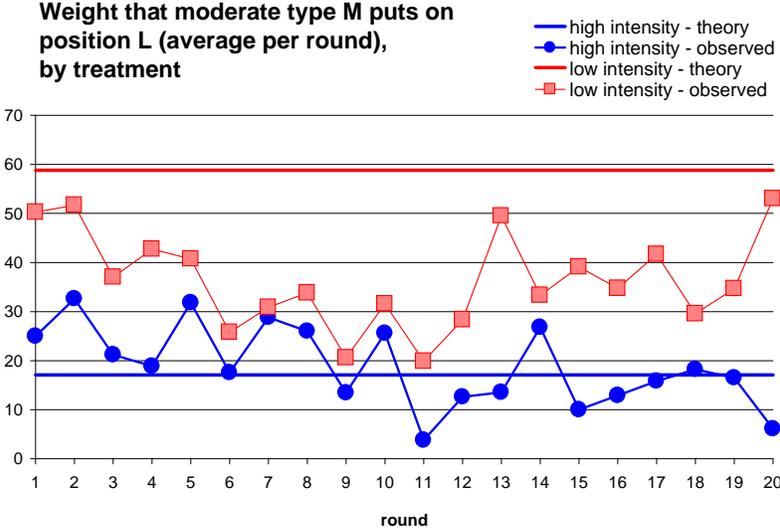
and voters expect to see only  $L$  messages during the primary race. In case voters observe an  $M$  message, they believe that it is  $\epsilon$ -more likely that the moderate type has sent it than the liberal type, that is,  $p_1 > \frac{1}{2}$ .

$$E\Pi_{(1-z,z)}^{t^B=L} = -80 \cdot z^8 + 50 \cdot \frac{1}{2} \cdot (1-z)^m \cdot \frac{1}{2} \Rightarrow \frac{\partial}{\partial z} = -640z^7 - \frac{50m}{4}(1-z)^{m-1} < 0 \Rightarrow z^* = 0$$

<sup>36</sup>Put differently, the main question of the experiment is not whether liberal candidates are able to recognize their dominant strategy. Therefore, this restriction does not change the trade-offs faced by the moderate candidates and the voters when the intensity of the primary election varies.

As expected, moderate candidates lie more in the low intensity condition than in the high intensity one. However, on average, candidates lie less than theory predicts in both treatments in the last 10 rounds of the game. In spite of that, there is a significant difference in the amount of lying between the two treatments as confirmed by the Wilcoxon Ranksum test ( $z = 2.418$  and  $p = 0.0156$ ) that rejects the hypothesis that those samples came from the population with the same distribution.<sup>37</sup> As it often happens in experiments, it takes subjects a few rounds to learn the game and adjust their strategies. Our experiment is not an exception in this sense, as can be seen from Figure 3 which plots the average lie of moderate candidates in each period of the game by treatment.

Figure 3: Predicted and observed behavior of moderate candidates, by treatment

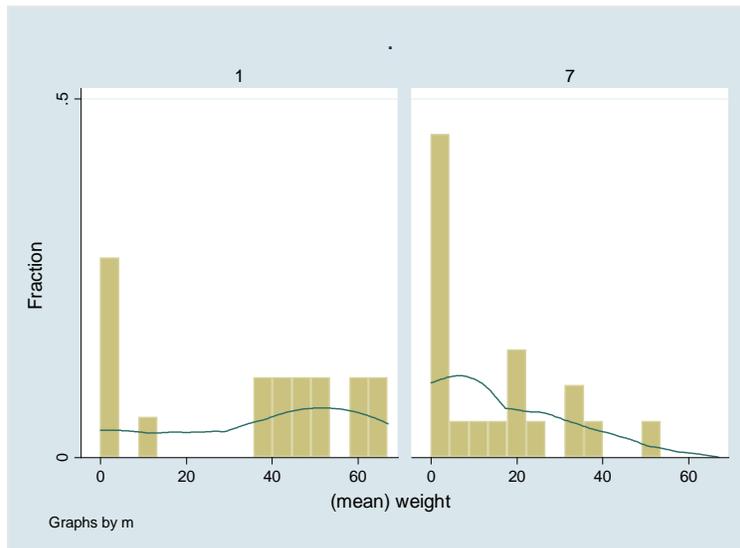


Note that the difference between average lies of moderate candidates increases with the experience. However, in every round including the early ones, moderate candidates lie more in the low than in the high intensity treatment.

Finally, we want to note that there is a significant variation in the behavior of candidates, with more dispersion observed in the low intensity treatment than in the high intensity one. Figure 4 shows the histogram of the average lies of moderate candidates in the last 10 periods of the experiment in each treatment (left panel - low intensity and right panel - high intensity).

<sup>37</sup>We performed the Wilcoxon Ranksum test on the average weight that each candidate put on the liberal position when he was assigned moderate type (one observation per subject). Averaging all observations per subject allows us to get rid of the correlation that comes from the fact that the same subject chose platforms several times during the course of the experiment. Another way to test for the treatment effect is to perform a two-sample Kolmogorov-Smirnov test for the equality of distributions: we reject the hypothesis that both samples came from the same distribution with corrected p-value = 0.009. Finally, when we regress an average lie per candidate on the dummy for the intensity of the primary stage we get the same significant treatment effect: moderate candidates in the low intensity treatment lie on average 17.6 points more than in the high intensity treatment.

Figure 4: Histogram of average lies of moderate candidates, last 10 periods (left panel - low intensity and right panel - high intensity).



A test of equality of the standard deviations between treatments confirms this observation: we reject the hypothesis that variances are the same ( $f = 2.6726$  and  $p = 0.012$ ). To summarize, the data above suggests that candidates understand that it is beneficial to be a liberal type in the primary stage and, thus, moderate types mimic the liberal ones to increase their chances of winning the nomination. As the theory predicts, more mimicking occurs in the low intensity treatment, in which there is less of a chance that a moderate type will be detected.

### 6.2.2 Behavior of voters

It is optimal for the moderate type to mimic the liberal type only if voters elect the "more liberal" type during the primary election. So, the next question we ask is whether voters realize the trade-offs faced by the different types of candidates and as a result vote for a "more liberal" candidate given the beliefs they hold regarding the true types of candidates. Table 4 shows how often voters elected the candidate that they believed was more liberal than his opponent in the primary stage.

Table 4: How often voters elected the candidate that they believed was more liberal than his opponent

	Low intensity	High intensity
In theory	100%	100%
Observed in all 20 periods	85.6%	87.5%
Observed in the last 10 periods	87.8%	85.0%

As Table 4 shows and as theory predicts, in the primary stage voters elect a more liberal candidate a majority of the time. In last 10 periods of the game, it happened 88% in the low intensity treatment and 85% in the high intensity treatment. Therefore, a moderate candidate will try to pretend to be a liberal one by lying in the primaries and sometimes sending an  $L$  message to increase his chances of winning the nomination.

### 6.2.3 Beliefs formation

Finally, we turn to the question of beliefs formation. According to the theory, voters use Bayes rule to update beliefs after observing messages from the candidates' platforms. For instance, a voter that observed all  $L$  messages from candidate  $j$  should compute the posterior belief using the formula  $\Pr[t^j = L] = \frac{1}{1+y^m}$ , where  $y$  represents the weight that the moderate candidate puts on the liberal position and  $m$  is the number of messages observed from the candidates' platforms. Moreover, since liberal candidates always send only  $L$  messages, voters should realize that if at least one  $M$  message is observed, it must signify the moderate type. In other words, one  $M$  message is enough to fully reveal the moderate candidate. Table 5 summarizes the theoretical and observed beliefs of voters in each treatment in two scenarios: when only  $L$  messages are observed and when at least one of the messages is  $M$ .<sup>38</sup> The belief that we report in this table is the belief that a candidate is a liberal type based on the messages observed from his platform.

Table 5: Theoretical and observed beliefs when all messages are  $L$ , and when at least one message is  $M$ , by treatment

	Low intensity		High intensity	
	mean	st dev	mean	st dev
<b>when all messages are <math>L</math></b>				
Theoretical belief <sup>39</sup>	0.63	0.00	0.99	0.00
Observed belief in all 20 periods	0.64	0.27	0.93	0.22
Observed belief in last 10 periods	0.66	0.29	0.99	0.11
<b>when at least one message is <math>M</math></b>				
Theoretical belief	0.00	0.00	0.00	0.00
Observed belief in all 20 periods	0.18	0.21	0.11	0.26
Observed belief in last 10 periods	0.18	0.22	0.10	0.24

In both treatments, when voters observe all  $L$  messages, the average belief regarding the type of this candidate is very similar to the predicted belief using the Bayes rule and the optimal strategies of the moderate candidates. To confirm this observation we perform a Wilcoxon signed-rank test and show that beliefs are not significantly different from the predicted one ( $p = 0.9528$  in low and  $p = 0.4416$  in high intensity treatment).<sup>40</sup> There is, however, a significant variation in the beliefs voters hold after seeing all  $L$  messages (see graphs in appendix "Lab Experiment").

When at least one  $M$  message is observed, we expect to see that voters immediately realize that a moderate candidate stands behind this platform, because liberal candidates are restricted to sending only  $L$  messages. This does not occur as some subjects, playing the roles of voters, seem to have

<sup>38</sup>In the low intensity treatment, voters observe only one message from the platforms of the candidates. Therefore, the two cases we consider are the ones where an  $L$  message is observed and where an  $M$  message is observed.

<sup>39</sup>To compute the theoretical prediction for the beliefs of voters we used the optimal strategies of the candidates:  $y = 0.588$  for low intensity treatment and  $y = 0.171$  for high intensity treatment.

<sup>40</sup>To get rid of the correlation between the beliefs formed by the same subjects several times, we averaged out all observations per subject. That is, the test is performed on the data that consists of one observation per voter (average belief when all messages were  $L$ ). If instead of using the theoretically predicted strategies of moderate candidates we were to use the ones observed in the experiment ( $y = 0.363$  in the low and  $y = 0.189$  in the high intensity treatment), then when all  $L$  messages are observed, voters should hold the belief of 0.73 in the low intensity and 0.99 in the high intensity treatment. Using the same Wilcoxon signed-rank test we still cannot reject the hypothesis that the observed beliefs are different from the theoretically predicted ones ( $p = 0.2135$  in low and  $p = 0.4416$  in high intensity treatment).

some trouble understanding that. Average beliefs are 0.18 and 0.10 in the low and high intensity treatments, and using the Wilcoxon signed-rank test we reject the hypothesis that those beliefs are equal to zero ( $p = 0.0178$  in low and  $p = 0.0110$  in high intensity). We do, however, observe that learning occurs with the experience gained in the game. In the low intensity treatment, in the first 10 periods, subjects realized that an  $M$  message signifies a moderate type in 36% of such instances, while this happened 52% of times in the last 10 periods. In the high intensity treatment, the corresponding numbers are 78% for the first 10 periods and 80% for the last 10 periods.

These results raise the question of why subjects are better able to update correctly in the high intensity treatment as opposed to the low intensity treatment. Our data suggests that two things may be responsible. First, in the high intensity treatment we find that the beliefs of the voters are sensitive to the number of  $M$  messages observed. When voters observe less than four  $M$  messages, 60% of the time they believe that it is the moderate candidate that stands behind such a platform, whereas when four or more  $M$  messages are observed, they believe it is the moderate candidate 87% of the time. In addition, given that moderate candidates played on average platform  $plat_1^M = (0.189, 0.811)$ , voters were much more likely to observe a sample of 7 messages with *many* (often six or seven)  $M$  messages than a sample of 7 messages with only one  $M$  message, while in the low intensity treatment they observed only one  $M$  message.<sup>41</sup>

To summarize, the results of the experiment suggest that voters understand the trade-offs that candidates face in the two-stage election game and recognize that they should support the more liberal candidate in the primaries. Moderate candidates correctly anticipate that behavior of voters and mimic the liberal candidates, with more mimicking occurring in the low than in high intensity treatment. Finally, although voters' beliefs are well predicted by the Bayes rule when voters observe all  $L$  messages, we find two interesting patterns in voters' beliefs when the latter observe one or more  $M$  messages, which cannot be explained by the current theory. First, in the high intensity treatment, there is a positive correlation between the number of  $M$  signals observed and the probability that voters think it is the moderate candidate that stands behind such a platform. Second, in the low intensity treatment, a big fraction of voters have trouble recognizing that an  $M$  message comes necessarily from the moderate type, which is less of a problem in the high intensity treatment. The latter effect suggests that voters do not trust one  $M$  message the same way they do when more than one  $M$  message is observed.

## 7 Discussion

### 7.1 Uniqueness of pandering equilibrium

**Proposition 8.** *When primaries are not very intense ( $m < s$ ) and uncertainty is big ( $a > -L$ )*

- *if  $k \geq s$  then PE is unique*
- *if  $k < s$  then except for PE, the only other equilibrium that may exist is the one in which both liberal and moderate candidates send both  $M$  and  $L$  signals in the primary election*

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<sup>41</sup>Notice that subjects do know that all  $L$  messages can come from either type of candidate, because the liberal ones are mimicked by the moderate ones. Thus, we hypothesize that some subjects incorrectly project the same idea on the situation in which an  $M$  message is observed. There is some variation in the beliefs formed by different subjects. We present the distribution of the average beliefs per voter over all 20 periods of the game in appendix XXX.

The proof of proposition 8 is based on the following observation: big uncertainty about the general election,  $a > -L$ , guarantees that Democrats elect a more liberal candidate in the primary stage. Therefore, full separation in the primary election is not possible, because the moderate type will have an incentive to misrepresent himself and increase his chance of winning the nomination. Similarly, there is no equilibrium in which the liberal type mimics the moderate one who plays the truth, because in this case the liberal type will deviate and play the truth. Finally, an equilibrium in which both types play mixed platforms may exist only if the intensity of the general election stage is not too big. To see that, recall that both types separate in the general election stage if  $k \geq s$ . Therefore, the liberal type has no incentive to keep his identity hidden from the voters during the primary election because he will not enjoy a higher chance of winning the second stage. When  $k$  is small, however, both types have an incentive not to reveal themselves in the primary race. The liberal candidate does so in order to enjoy a higher chance of winning the general election in case he wins the primary and successfully mimics the moderate type in the second stage. The moderate type does so because he wants to increase his chance of winning the nomination. This is the reason that for small  $k$  there might be an equilibrium in which both types play mixed platforms in the primary.

## 7.2 Uncertainty about general election

One of the necessary conditions for the existence of **PE** is relatively big uncertainty about the general election stage (see section 3.3). When uncertainty  $a$  is big, the moderate type has only a slightly bigger chance of winning the general election than the liberal type; thus, Democrats elect a more liberal candidate during the primary stage. When, however,  $a$  is small, Democrats will elect a more moderate candidate during the primary stage, because a moderate candidate has a much higher chance of winning the election compared with a liberal one. Thus, when  $a$  is small, in equilibrium, the liberal type mimics the moderate type *at every stage* of the election. Notice that in this scenario neither of the three empirical observations discussed in section 5 will hold true. First, an increase in the intensity of the primary will lead to a higher chance of nominating the moderate candidate, which in turn will increase the chances of the Democrats in the second stage contrary to DPH. Second, a moderate candidate is the more likely to win both the primary and the general election stage. Third, an intense primary and an intense general election both have a moderating effect on the elected legislators contrary to the effects estimated in section 5.

## 7.3 Naive voters

Analysis presented in this paper assumes that the voters are completely rational and forward-looking in the sense that, during the primary election, they weigh in both the distance to the candidates' expected type and their probability of winning the second stage of election. It is, however, possible to obtain the same results if one assumes that voters are partially naive. That is, voters rationally update beliefs about each candidate using Bayes rule, but in the primary election they vote for a candidate whose expected type is closer to their ideal points (and do not take into account what will happen in the general election stage). The crucial connection between primary and general election stage in our analysis is the belief  $p_1$  regarding the challenger's type that voters carry from the primary stage. As long as voters remember  $p_1$  all the results will go through with naive voters.<sup>42</sup>

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<sup>42</sup>If voters are naive, but retain memory between stages, pandering equilibrium exists for *any* level of uncertainty about the general election stage.

## 7.4 Entry of candidates

Finally, say that candidates incur fixed costs of entering the primary race. In this section we are interested in which types of candidates are more likely to enter the competition for different entry costs and what role  $m$  (intensity of the primary race) plays in this. Our goal here is to suggest that intensity of the primary race may affect the decision of candidates to enter the competition. To keep things simple, consider the case in which voters observe many signals from candidates' platforms in the general election stage,  $k \geq s$ , and exactly two candidates enter the primary.<sup>43</sup>

To characterize values of entry costs  $c$  for which candidates find it worthwhile to enter the competition, we compute expected profits of candidates in **PE** if both types enter with equal probability (as in the model studied here):

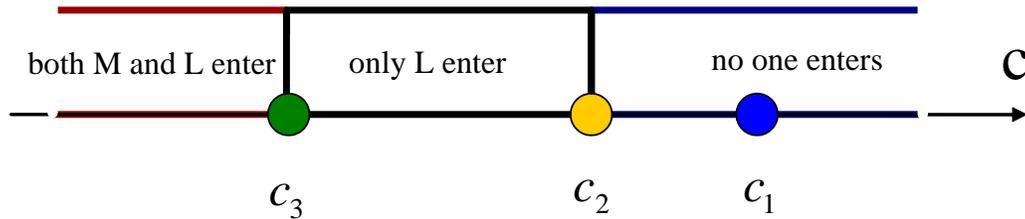
$$E\Pi^{t=M} = \frac{1 + y^m}{4} (f_0 + f_1) \quad \text{and} \quad E\Pi^{t=L} = \frac{3 - y^m}{4} f_0$$

It can be shown that if uncertainty about the general election  $a$  is big enough, or, equivalently, function  $f(\cdot)$  is flat enough<sup>44</sup>, then

$$c_3 = E\Pi^{t=M}|_{\text{both types enter}} < c_2 = E\Pi^{t=L}|_{\text{only L enter}} < c_1 = E\Pi^{t=L}|_{\text{both types enter}}$$

where  $E\Pi^{t=L}|_{\text{only L enter}} = \frac{f_0}{2}$  and it represents the expected profit of a liberal candidate if only liberal candidates enter the competition. Therefore, for some costs  $c$  both types of candidates will be equally likely to enter the competition, while for the higher costs only liberal candidates will enter (see Figure 5).

Figure 5: Costly entry of Candidates



Finally, notice that an increase in the intensity of the primary race decreases the expected profit of a moderate candidate in **PE** as he loses the election more often,  $\frac{\partial c_3}{\partial m} < 0$ . Put differently, the range of entry costs for which moderate candidates enter the competition becomes smaller as the intensity of the primary race becomes bigger.

## 8 Conclusions

In this paper, we study a signaling model of elections, in which candidates must obtain their party's nomination before competing in the general election. Candidates are allowed to change platforms

<sup>43</sup>We leave the question of what happens when more than two candidates compete in the primary election for future research.

<sup>44</sup>The sufficient condition for that is  $M < \bar{M}$ , which in turn guarantees that  $y^m < \frac{f_0 - f_1}{f_0 + f_1} < \frac{2f_0 - f_1}{2f_0 + f_1}$ .

in every stage of the election, however, a candidate that uses a platform that misrepresents his true type incurs convex costs of lying. Moreover, we allow different stages of the election to have different intensities, measured by the number of signals observed by voters from the candidates' platforms in each stage of the election, and show that these intensities play an important role in the selection process of candidates.

In equilibrium, candidates perform the well-known maneuver of running to the party's base during the primary and moving to the center once the nomination is secured. In addition, an increase in the intensity of the primary election affects negatively the chances of the party to win the election, the result known in the literature as the divisive primary hypothesis (DPH). Further, we demonstrate that intense primaries elect more extreme candidates, while intense general elections elect more moderate one, other things being equal. In other words, elections serve as the arena for information transmission between candidates and voters and the intensity measures the degree of this transmission. We use the data from House races in 1998 to validate these predictions.

Finally, we supplement theoretical and empirical results by conducting the controlled laboratory experiment, in which we study whether voters understand the trade-offs that candidates face in two-stage elections with different intensity of the primary stage. In the experiment we observe not only the behavior of the voters but also elicit the beliefs voters hold regarding the true types of candidates, given a number of signals observed. The results of the experiment suggest that voters elect the more liberal (according to their beliefs) candidate in the primary stage. Moderate candidates correctly anticipate that behavior and mimic liberal candidates, with more mimicking occurring in the low than in high intensity treatment as predicted by the model. Further, we discuss the belief formation process, and show when Bayes rule seems to approximate well voters' beliefs and when not.

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