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A Model of the 2000 Presidential Election: Instrumenting for Ideology

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Abstract

In a spatial model of voting, a voter's utility for a candidate is a function of ideological distance from the candidate and a candidate's quality. Candidate quality can potentially bias the measure of ideological distance in two ways. First, voters may be more drawn to high quality candidates thereby reducing the ideological distance. Second, a candidate's ideological position is a function of rivals' qualities and his own quality. We derive a theoretical model to sign the direction of both biases analytically. Next, using techniques established in the industrial organization literature, we estimate the model using two sets of instrumental variables.

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1 Introduction

New game-theoretic models of elections extend the standard Downsian model to account for two components in a vote choice. The first component is the ideological distance between voters and candidates, a mainstay of the Downsian model [Downs (1957)]. The second component is a voter's perceived qualities of the candidates, which summarizes all non-ideological factors affecting the vote choice, like competence, charisma and the moral attributes of the candidates. A natural question in the light of these models is how important ideology is in a vote choice. This paper identifies two sources of omitted variable bias when estimating a voter's sensitivity to ideological difference caused by treating candidate quality as exogenous. First, high quality candidates may be more persuasive than their rivals, thereby drawing voters closer to their policy position and decreasing ideological distance. Next, a candidate's observed policy position is the result of a strategic encounter. Therefore, a candidate's announced policy position, in equilibrium, is a function of his rivals' policy positions and qualities as well as the candidate's own quality. Our main contribution is to estimate the extended Downsian model addressing these two biases.

The main parameters of interest are the relative weight of ideology to other non-ideological factors in the vote choice, and the perceived qualities of the candidates. Two estimation challenges are addressed. First, the voter's observed ideology may be correlated with the unobserved perceived qualities of the candidates. Intuitively, a high quality candidate may be more persuasive than his lower quality rivals leading voters to choose his position as "the right one." High quality candidates are capable of drawing voters closer to their ideological position, thereby reducing the ideological distance. A naive estimation capturing the weight of ideological distance in the voter's choice may overstate the true effect. If the quality of the candidate is both unobserved and negatively corre-

lated with ideological distance, then a small difference in ideology is overstated in the voter utility function for high quality candidates.

The second estimation challenge addresses the correlation between candidate quality and the announced policy position. If a candidate chooses his policy announcement strategically, then, in equilibrium, the candidate's announcement is a function of his rivals' qualities as well as his own. The expected direction of the bias is dependent on the theoretical framework adopted. The game-theoretic models by Ansolabehere and Snyder (2000) and Aragones and Palfrey (2007), together with simulations provided by Schofield and Sened (2006) suggest that, in equilibrium, candidates with quality advantages tend to locate closer to the electoral center.[1] In their theoretical framework, a naive estimation of the model tends to exaggerate the true importance of ideology in the voter's choice. However, these studies assume that voters have identical perceptions of the candidates' qualities, which is strongly rejected in our empirical analysis. For this reason, we provide a new, simple game-theoretic model that better accommodates the data. In our model, voters are allowed to differ in their quality perceptions. Also, candidates are allowed to microtarget their announcements such that groups of voters with different quality perceptions receive a (somewhat) different message, at a certain cost to the candidate. Microtargeting is a technique that tailors the electoral message to a subpopulation of voters based on unique information about that group.[2] The tailored message is delivered using various means of communication, such as direct mail, phone calls, home visits, radio ads, and television ads. Since communication is expensive, candidates may find it optimal to spend money only, or mainly, on voters with a high rate of return. For example, a candidate may not find it optimal to invest in

[1] A different result is obtained in Groseclose (2001) by assuming that candidates are both office motivated and policy motivated.

[2] Voters' demographic information can be obtained from consumer and demographic databanks.

voters whose preferences match very well with his political platform, because those voters are already likely to vote for him. Instead, the candidate can use those resources to microtarget voters whose support he needs to win the election and whose policy preferences are less congruent with his political platform. We find that candidates behave in this fashion in equilibrium within our theoretical setting. The testable implication is that a naive estimation of the model tends to understate the true importance of ideology in the voter's choice, compared to a model in which the omitted variable problem is resolved.

The endogeneity in voter ideology has been previously discussed in Degan (2007), but the solution of the problem is out of the scope of her paper. To the best of our knowledge, the endogeneity problem in candidate's ideology has not been addressed in the voting literature, despite being an analog to the endogeneity of firm location and price in models of differentiated products within the industrial organization literature.[3] The key insight is that the observed position of a candidate (the location of a firm) results from the equilibrium of a strategic interaction which has as primitives the quality of the candidates (the attributes of the differentiated products). Firms who produce high quality products set higher prices. It should be no surprise that high-quality candidates enjoy some strategic advantage, too.

This paper contributes to the voting literature in three ways. First, we identify a new omitted variable bias (in addition to the one pointed out in Degan (2007)). Second, we present a formal model whose assumptions accommodate the data and whose results give an unambiguous direction of the bias for the new omitted variable bias. Third, we propose two sets of instrumental variables to address both biases simultaneously, and estimate the model. Our empirical estimates are in full agreement with the predictions of the theoretical framework

[3] In response, the literature has provided estimation techniques focused on instrumenting for price in the presence of unobserved product quality [Berry (1994), Berry, Levinsohn, and Pakes (1995), Nevo (2000)].

for both problems.

The proposed model is estimated using data from two time periods: (1) the 2000 U.S. Presidential election and (2) the 1896 US Presidential Election. The 2000 general election was contested between George Bush (the winner) and Al Gore. In the Democratic primary, Al Gore's main competitor was Bill Bradley. In the Republican primary, George Bush's main competitor was John McCain. The endogeneity problem in voter ideology is addressed using vote share of the Republican and the Democratic parties in the 1896 election as an instrument for the ideology of voters in the 2000 election. Miller and Schofield (2003) use state level data to demonstrate that the vote share of the 2000 Presidential election is highly correlated with the vote share of the 1896 Presidential election. The intuition lies in time invariant, location specific, preferences captured in the results of the 1896 election. These preferences are correlated with voter ideology in 2000, but are independent of candidates' unobserved qualities in 2000 as these candidates did not exist in 1896. The two requirements for a valid instrumental variable are satisfied.

The set of instruments used to address candidate policy position endogeneity are drawn from the industrial organization literature. In this literature, a product's price in market j is instrumented by using rivals' prices from markets outside of market j. These prices do not affect consumer demand in market j, but are correlated with the underlying cost structure for the products in this market. Therefore, these prices are also correlated with the firm's price in market j. In the election market, we consider a primary rival's ideology from the opposing party as an instrument for the presidential candidates' perceived ideology. For example, the ideological position of Bradley is used to instrument for Bush and the ideological position of McCain is used to instrument for Gore. Bush must choose an ideological position, which secures him victory in

the Republican primary and remains competitive in the General Election. It is plausible for Bush to take a policy position conditional on both Gore's position and McCain's position. Bradley's policy position does affect Gore's policy position in the Primary and indirectly affects Bush's policy position through Gore. Therefore, Bradley's position is correlated with Bush, but Bush and Bradley never face each other in an election. Therefore, Bradley's policy position does not affect the vote within an election contested by Bush. The same holds true for McCain and Gore.

The use of these instruments addresses one potential source of endogeneity in a candidate's policy position. A second source to consider is microtargeting within a market. Both Gore and Bradley may take more liberal positions in counties that are traditionally more democratic, but appear more conservative in counties that are traditionally conservative (or Republican). Differences in voter ideology by county provides an incentive for candidates to deviate from their national message.[4] We address this issue by constructing the proposed instrument using only voters' perceptions from outside of the county. The perceived policy position of candidate j by voters not residing in county k is correlated with the perceived policy position of voters in county k, but uncorrelated with "microtargeting" efforts within county k.

Our findings are as follows. First, as our previous discussion suggests, once the endogeneity in the ideology of voters is removed, ideological distance becomes less relevant in explaining vote choice than suggested by naive models. Second, unlike pre-existenting game-theoretic models of voting, when the endogeneity in the candidate ideology is removed, ideological distance becomes much more relevant in explaining vote choice than suggested by naive models. The

[4] Callander (2005) offers a formal model with heterogenous districts. Since in his model candidates are not allowed to microtarget, in equilibrium they choose noncentrist, divergent, policy platforms. Our work and his work are complementary, since we deal with different effects caused by the presence of heterogeneous districts.

latter effect is the dominating bias. Therefore, when one accounts for these endogeneity problems ideological distance becomes more relevant. Further, these estimates support the idea that candidates avoid microtargeting voters that ex-ante are *more* likely to support them. Instead, they use their resources to microtarget swing voters that ex-ante are *less* likely to support them.

The remainder of the paper is structured as follows. Section 2 introduces a simple game between two candidates whose problem is to optimally allocate microtargeting resources. Section 3 discusses two endogeneity biases present in the estimation of spatial voting models. Section 4 describes the data. Section 5 discusses the methodology. Section 6 presents the results. Section 7 concludes.

2 Voting with microtargeting

Consider the following two-stage game with two office seeking candidates. In period one, based on his quality and his rival's quality, each candidate chooses a general announcement, i.e. a policy position that is automatically and costlessly delivered to all voters. In period 2, the candidates have the opportunity to microtarget any particular voter at a certain cost, subject to a budget constraint. Microtargeting may be either (i) a tailored message that moves the candidate closer to the voter on ideological grounds or (ii) propaganda that enhances the voter's perception of the quality of the candidate.

Such game seems to be a reasonable description of actual electoral contests. The two-stage game is solved backwards. For every possible profile of general announcements, there is a subgame that begins in period 2. The solution to the last-stage of the game sheds light on how candidates allocate resources to microtarget voters, conditional on a particular profile of general announcements. We focus on the second stage of the game where candidates make optimal choices

on microtargeting.[5]

Consider two candidates who seek to win office, L and R, and five groups of voters. The utility received by voter group i from candidate j is given by

$$u_{ij} = a_{ij} + b_{ij} + e_j. \tag{1}$$

The deterministic component a_{ij} represents the exogenous utility that voter i gets from candidate j. This component aggregates all dimensions relevant to the vote, including ideology and perceived quality of the candidate, b_{ij} is another deterministic component of utility, but, unlike the exogenous a_{ij}, b_{ij} is chosen by candidate j. It represents the utility that candidate j gives voter i based on spending resources in microtargeting, either to make voter specific announcements or to enhance voter i's perception of candidate j's quality.[6] Each candidate j has a budget constraint, B_j, which represents the amount of resources available to spend in microtargeting the voters. The stochastic component e_j represents a quality shock that takes place after the candidates decided b_{ij} for every j, but before the election takes place. Hence, candidate j chooses b_{ij} for every i without observing ε_L and ε_R, although he knows the distribution from which they are drawn.

The timing of the game is as follows. First, candidates and voters observe a_{ij} for every i and j. Second, after observing a_{ij} for every i and every j, each candidate j chooses b_{ij} for every i subject to his budget constraint

$$\sum_{i=1}^{I} b_{ij} \leq B_j.$$

[5] Of course, the solution to our model could be in turn used to find the optimal general announcements. We would just have to find the profile of general announcements that is a sub-game perfect equilibirum. However, we do not need to solve the larger game to answer our question.

[6] Microtargeting can be perceived as goodwill advertising for the candidate.

Candidates' choices of b_{ij} are made simultaneously and non-cooperatively. Third, voters (and candidates) observe the realization of the random shocks e_L and e_R, common across voters. Finally, each voter votes for the candidate that gives him the highest utility according to equation 1, and the candidate with the most votes wins the election.

The probability that voter i votes for candidate L is

$$\rho_{iL}(b_{iL}, b_{iR}) = \Pr[u_{iL} > u_{iR}].$$

so that

$$\rho_{iL}(b_{iL}, b_{iR}) = \Pr[\varepsilon_L - \varepsilon_R > a_{iR} + b_{iR} - (a_{iL} + b_{iL})] \tag{2}$$

and $\rho_{iR}(b_{iL}, b_{iR}) = 1 - \rho_{iL}(b_{iL}, b_{iR})$. The probability of victory of candidate j, $\rho_j(b_L, b_R)$, is the probability of obtaining more than 50% of the vote.

In the model, group 1 and group 5 are partisan (non-swing) voters. These groups are modelled by setting a_{1L} and a_{5R} high enough so that for any value in the support of $\varepsilon_L - \varepsilon_R$, $u_{1L} > u_{1R}$ and $u_{5L} < u_{5R}$ for any $b_L \equiv (b_{1L}, \ldots, b_{5L}) \in B_L$ and $b_R \equiv (b_{1R}, \ldots, b_{5R}) \in B_R$. In other words, group 1 always prefers candidate L and group 5 always prefers candidate R. We order voters decreasingly in terms of their relative utility $a_{iL} - a_{iR}$ for candidate L. Hence,

$$a_{1L} - a_{1R} \geq a_{2L} - a_{2R} \geq \ldots \geq a_{5L} - a_{5R}.$$

describes the relative ranking of utility among voters. We define the observable component of utility as $u^o_{ij} \equiv a_{ij} + b_{ij}$ and the difference in observable utility in favor of candidate j as

$$\Delta_j u^o_{ij} \equiv (a_{ij} + b_{ij}) - (a_{ik} + b_{ik})$$

for $k \neq j$. Note, for $\Delta_j u^o_{ij} > 0$ voter i ex-ante supports candidate j, for $\Delta_j u^o_{ij} = 0$ voter i is indifferent between the two candidates and otherwise supports candidate k. The support of the exogenous shock $\varepsilon_L - \varepsilon_R$ is assumed to include values such that voters $2, 3$ and 4 have a chance of supporting both candidates.

The following proposition states the Nash equilibrium in the game where candidates L and R maximize their probability of victory. Let $b_j = (b_{1j}, \ldots b_{5j})$ be the vector of summarizing candidate j's microtargeting efforts over the five voter groups.

Proposition *The unique Nash equilibrium of the game is* b^*_L, b^*_R *such that*

$$b^*_L = \arg\max_{b_L} \{\min\{\Delta_L u^o_2, \Delta_L u^o_3\}\},$$

$$b^*_R = \arg\max_{b_R} \{\min\{\Delta_R u^o_3, \Delta_R u^o_4\}\}.$$

Proof. In Appendix.

The equilibrium vector of strategies in the proposition resembles the argument that maximizes a Rawlsian social welfare function (RSWF). A RSWF is maximized when the utility of the individual with lowest utility is maximized. In the proposition above, each candidate maximizes his probability of victory when he maximizes the utility of the voter with the lowest relative utility among all the voters in his minimum winning coalition. Interestingly, the "egalitarian solution" in the proposition results from the behavior of self-interested agents (candidates maximizing their expected probability of victory) rather than the imposition of a positive postulate (as occurs with the RSWF).

The following corollary offers further insight on the equilibrium strategies of the candidates.

Corollary *In equilibrium,*

i) $b^*_{1L} = b^*_{4L} = b^*_{5L} = 0$ *and* $b^*_{5R} = b^*_{2R} = b^*_{1R} = 0$.

ii) $b^*_{2L} \leq b^*_{3L}$ *and* $b^*_{4R} \leq b^*_{3R}$

iii) $u_{1L} - u_{1R} \geq \ldots \geq u_{5L} - u_{5R}$

Proof. Derives immediately from the proposition and its proof.

Corollary i states the following: Voters 1 and 5 are partisan such that spending resources on them would be wasteful. Therefore, spending money in building a coalition that is not minimal (more than three voters) would be wasteful. Candidate L needs the support of voters 2 and 3 in addition to voter 1 to meet the minimum coalition size that secures victory; Candidate R needs the support of voters 3, 4, and 5 to meet the minimum coalition size. In equilibrium, all the candidates' resources must be allocated to appeal these voters.

Corollary ii says that among the voters that belong to their minimum winning coalition, each candidate spends more money in those that have the lowest ex-ante relative utility. Hence, in equilibrium u^o_{ij} and b_{ij} must be negatively correlated. In other words, candidate L spends more resources in voter 3 than in voter 2, and candidate R spends more resources in voter 3 than in voter 4. Note, this is not due to the fact that voter 3 has greater decision power relative to voters 2 and 4, but to the fact that voter 3 is more likely to swing after the random shock $e_L - e_R$ occurs. Among all voters, 3 is ex-ante most indifferent between both candidates. The implication that u^o_{ij} and b_{ij} must be negatively correlated is the focus of our empirical research. The remaining sections of this paper are devoted to testing this implication.

Corollary iii states that, as a result of the equilibrium strategies, voters with higher $a_{iL} - a_{iR}$ end up with at least the same relative utility $u_{iL} - u_{iR}$ than voters with lower $a_{iL} - a_{iR}$. There is no difference in payoff between being supported by only one and only two voters. Hence, the candidates tend to equate the utilities from the two swing voters closest to them. They do this to avoid the risk of ending up with only the partisan vote. Note, if the budget is large

enough, each candidate allocates money such that his two recipients get exactly the same relative utility. In this case, the result will be $u_{2L} - u_{2R} = u_{3L} - u_{3R}$ and $u_{3R} - u_{3L} = u_{4R} - u_{4L}$, and so $|u_{iL} - u_{iR}| = k \geq 0$ for every i.[7]

Broadly speaking, the proposition and its corollaries suggest that candidates use their available resources to increase the scope of their support rather than the strength of the support from each voter. This finding has anecdotal support. The following quotation from Ken Strasma, head of targeting efforts for Barack Obama's 2008 campaign, demonstrates that microtargeting was indeed the strategy used in Gore's 2000 campaign:

> "Microtargeting has evolved from an interesting buzzword to a must-have technology for any serious campaign. Campaigns are all about getting messages out to the people who are most likely to be on the fence. We ask 10,000 voters their opinions on the race and key issues and combine the results with marketing data about them. We can predict how other people with similar demographic profiles would have answered those same questions, and we start to see trends. Gin drinkers may be more likely to be Democrats. Driving an SUV may make someone more likely to be Republican or more sensitive to changes in gas prices. Those correlations tell us what kinds of messages voters may be receptive to. In 2000, we found that one of the worst groups in Florida for Gore was young white men, but also that they could be moved by a message about protecting the Everglades." (Svodoba, 2008)

[7] Same will happen if the voters consider that the candidates are close (enough) substitutes.

3 Two endogeneity biases

Consider a model with I voters and 2 office-motivated candidates. Let i and j index voters and candidates, respectively. Each voter has a preferred ideological position, x_i, within the traditional liberal-conservative space.[8] Candidates announce their ideological positions simultaneously. We allow voters to have different perceptions of a candidate's ideological position. We use z_{ij} to denote voter i's perception of the policy position announced by candidate j. The utility that voter i receives from voting for candidate j in election n is given by

$$u_{ijn}(x_i, z_{ij}) = -\beta \, ||x_i - z_{ij}|| + \eta_i \theta_j + \lambda_{ij} + \varepsilon_{ijn} \tag{3}$$

where θ_j is a $kx1$-vector that represents the influence of various sociodemographic variables in the choice for party j, η_i is a $1xk$-vector describing sociodemographic characteristics of voter i, the operator $||\cdot||$ is the Euclidean norm, and the parameter $\beta > 0$ captures voter's sensitivity to distance between a candidate's policy position and their own. The term λ_{ij} represents all the characteristics of candidate j not captured by policy position, as perceived by voter i. We think of λ_{ij} as voter i's perception of candidate j's quality. Finally, the model is stochastic because it includes an idiosyncratic taste shock, ε_{ijn}, which represents a shock to voter utility for candidate j. Although ε_{ijn} is unobserved, the candidates are assumed to know the distribution from which this value is drawn. Hence, the quality of candidate j is the sum of a deterministic and a stochastic component, $\lambda_{ij} + \varepsilon_{ijn}$.

[8] Although the theoretical model allows for any number of dimensions, our data restricts us to a one dimensional space.

3.1 Endogenous ideology of the candidates

Consider the benchmark model in which the perceptions of the policy announcements from each candidate are identical across voters, that is, $z_{ij} = z_j$ for every $i \in I$. Each candidate maximizes his probability of victory subject to the parameters of the model (his quality, his rivals' qualities, the distribution of voter ideology, and voter sociodemographic characteristics) and the policy positions chosen by his rivals. An equilibrium of the game, denoted by $z_1^*, \ldots, z_J^*$, is a strategy profile such that, given rivals' strategies, each candidate maximizes his expected probability of victory.

Whenever the candidates have identical qualities, $\lambda_j = \lambda$ for all j, the equilibrium is given by the well-known "median-voter theorem" where both candidates announce the policy position preferred by the median voter.[9] Instead, consider a scenario where, without loss of generalization, candidate 1 has a quality advantage over candidate 2 ($\lambda_1 > \lambda_2$). Aragones and Palfrey (2004, 2002) use a deterministic model (ε_{ijn}.is set to zero for all i, j and n) to demonstrate that no pure strategy equilibrium exists. In mixed strategies, candidate 1 announces a policy close to the electoral center and candidate 2 moves to the periphery of the electoral space. We refer to this outcome as the *homogenous quality divergence hypothesis*, which says, when quality perceptions are homogenous across voters, the higher quality candidate is more likely to locate close to the electoral center than the lower quality candidate. Intuitively, if the low quality candidate moves close to the electoral center, the two candidates become close substitutes along ideological grounds and voters then base their decision on quality, leaving the low quality candidate with no support at all.

Even when λ_j is unobserved, the parameters β and θ_j can be estimated

[9] Strictly speaking, the median voter theorem only holds for the "deterministic model" in which $\varepsilon_{ij} = 0$. However, a similar result, known as the mean voter theorem obtains when the latter condition is not satisified. See among others Lin et al. (1999), McKelvey and Patty (2006), Banks and Duggan (2005) and Schofield (2007).

using limited dependent models like conditional multinomial logit and probit. However, if the homogenous quality divergence hypothesis holds, then, in equilibrium, the announcement of a high-quality candidate is more centrist, and hence closer to the bulk of voters than the announcement of a lower quality rival. Failure to account for the unobserved error component of utility, λ_j, causes an omitted variable bias in the estimate of β towards positive infinite.

In contrast, consider a scenario where candidates can microtarget their messages at a certain cost. A plausible way to model microtargeting is to allow the position of candidate j as perceived by voter i to depend on candidate j's investment on individualizing his message for voter i. Hence, in this setting, the utility can be re-written as

$$u_{ij}(x_i, z_{ij}) = -\beta \left|\left|x_i - z_{ij}\left(m_{ij}\right)\right|\right| + \eta_i\theta_j + \lambda_{ij} + \varepsilon_{ijn} \tag{4}$$

where $z_{ij}(\cdot)$ is voter's i perception of candidate's j policy position. A candidate's perceived policy position is a function of the money spent by candidate j on microtargeting voter i, m_{ij}. Since microtargeting is costly, candidates optimally spend their resources in voters with a high return rate. Candidate j invests more resources to microtarget his policy announcement to those swing voters that are less likely to vote for him based on non-ideological factors. A swing voter who is unlikely to vote for candidate j based on the candidate's perceived quality may be a better investment than a voter who already believes the candidate to be of high quality. A tailored message may suffice to make the first voter support the candidate. The marginal benefit of investing more resources into the second voter, who is likely to support the candidate, may be small. This leads to the *heterogenous quality divergence hypothesis,* which says if quality perceptions are heterogenous across voters, then as a candidate's quality increases, as perceived by the voter, the expected ideological distance

between them increases. The candidate is less inclined to spend resources to microtarget a voter who already perceives him to be of high quality**.** Note, the heterogenous quality divergence hypothesis is in full agreement with the equilibrium found above in the proposition. The portions of utility $\eta_i\theta_j + \lambda_{ij}$ and $-\beta\,||x_i - z_{ij}\,(m_{ij})||$ are the analog to a_{ij} and b_{ij} in equation 1, respectively. Under this specification, candidate j spends money m_{ij} on voter i with the aim to move the voter's perceived policy position of the candidate closer to the voter i's most-preferred policy.[10]

The homogenous quality divergence hypothesis and the heterogenous quality divergence hypothesis yield almost opposite predictions. The homogenous quality divergence hypothesis predicts that a high quality candidate is likely to be ideologically close to (the bulk of) the voters. The heterogenous quality divergence hypothesis predicts that a candidate is likely to be ideologically far from those voters that consider him to be a high quality candidate. If the heterogenous quality divergence hypothesis holds, then a naive estimation where λ_{ij} is omitted biases β towards negative infinite because quality perceptions and probability of vote are positively correlated. Eventually, a naive estimation may yield a negative value of β, as if ideological distance were to increase the utility level. An instrumental variable for z_{ij} can solve this endogeneity problem.

We propose using the policy position associated with candidate j's rival **in the primary** as an instrument for candidate j's rival in the general election. In the industrial organization literature, firms make pricing and production decisions strategically, i.e., conditional on the pricing and production decisions

[10] An alternative specification of equation 4 is

$$u_{ij}(x_i, z_j) = -\beta\,||x_i - z_{ij}|| + \eta_i\theta_j + \lambda_{ij}\,(m_{ij}) + \varepsilon_{ij}.$$

Under this alternative specification of $u_{ij}(x_i, z_j)$, $-\beta\,||x_i - z_{ij}|| + \eta_i\theta_j$ and $\lambda_{ij}\,(m_{ij})$ would be the analog to a_{ij} and b_{ij} in equation 1, respectively. Here, candidate j spends money m_{ij} with the aim to enhance voter i's perceived quality of candidate j. Both specifications lead to the same conclusions. Our empirical strategy does not allow us to support one specification or the other. Schofield (2006) studies a model with similar characteristics. However, in his model the perception of quality is identical across voters.

of their rivals. We extend this approach to elections, in full agreement with the theoretical model of politics. Consider a primary election. Candidates choose positions on policy issues conditional on their rivals' positions. The winning candidate takes his position into the general election, or a policy position highly correlated with this original position. Therefore, a primary rival's policy position is correlated with a candidate's policy position in the general election, but is uncorrelated with the voter's decision in the general election. Since, the rival candidate is no longer in the voter's choice set during the general election, he or she cannot affect the vote outcome.

Although the proposed instrument should correct for endogeneity associated with the homogenous quality divergence hypothesis, the instrument may still be correlated with microtargeting. There still exists the possibility that, say, Gore and Bradley's received messages are correlated with Bush's received message. This strategy may occur if candidates tailor their messages at the state or county level. For example, not only Gore and Bradley, but Bush as well, may attempt to move their platforms to the left when they address their messages to voters in Massachusetts. Therefore, the instrument is constructed using rivals' policy positions as perceived by voters *not* in the same election market as voter i (i.e., different states or counties). The modified instrument is independent of candidate j's unobserved quality as perceived by voter i because voter i's ideology does not affect the instrument. Further, the modified instrument is independent of local ideological preference, which change as a result of the candidates tailoring their messages to specific audiences.

3.2 Endogenous ideology of the voters

Implicit in the previous model is the assumption that voter's preferences are independent of a candidate's policy position. This assumption underestimates

the role of deliberation and public discussion in a democracy. In pre-electoral debates, voters' policy preferences are yet to be "formed", among other reasons because new information will flow. The candidates' announcements are usually followed by explanations, arguments, and discussion to persuade the voters. It is plausible to think that high quality candidates are more effective in convincing voters that their policy positions are better than their lower quality rivals. We refer to this phenomena as the *deliberation hypothesis*. The utility function accounts for this hypothesis by allowing voter ideology, $x_i(\cdot)$, to be a function of candidates' qualities.

$$u_{ij}(x_i, z_{ij}) = -\beta \left|\left|x_i\left(\lambda_{i1}, \ldots, \lambda_{iJ}\right) - z_{ij}\left(m_{ij}\right)\right|\right| + \eta_i\theta_j + \lambda_{ij} + \varepsilon_{ijn} \qquad (5)$$

The deliberation hypothesis implies that, in a naive estimation where λ_{ij} is omitted, the estimate of β is biased. That is, if (i) the true model is given by equation 5, where λ_{ij} enters in the utility function of the voter, and (ii) λ_{ij} is correlated with candidate j's ability to convince the voter that his position is "the right position", then the omission of variable λ_{ij} is likely to generate an inconsistent estimation of the coefficient β. If the deliberation hypothesis holds, in a naive estimation β may be biased towards positive infinite. The importance of ideological distance in the vote choice is overestimated. This bias occurs because candidate quality increases the probability of vote and, by the deliberation hypothesis, it decreases the ideological distance. In order to obtain a consistent estimation of β in the presence of omitted variables, an instrumental variable (IV) can be used. A valid IV must be highly correlated with the ideological distance between the voter and the candidates, but uncorrelated with the quality of the candidates.

We propose using the vote share of the Republican and Democratic parties in the 1896 election as an IV for the position of the candidates in the 2000 election.

Miller and Schofield (2003) provides evidence that the 2000 Presidential election in the United States is highly correlated with the 1896 election. The authors find using state level data that voter share in 1896 predicts the vote share in 2000 very well.[11] The observed correlation is interesting for two reasons: (1) these elections are distant by more than 100 years; (2) the correlation has a striking pattern, since the vote share of the Democratic party predicts very well the vote share of the Republican party, and the vote share of the Republican party predicts very well the vote share of the Democratic party. In other words, there is a nearly perfect reversal of the partisan alignment between 1896 and 2000. The correlation in voting patterns between these two elections is based on geographical factors that affect the preferences. Although one may think that the quality of a party may be correlated with its short-term and perhaps even medium-term vote share, it is very unlikely that such effect can persist for over 100 years.[12]

4 Data

The paper utilizes data from two sources to estimate the theoretical model. The first dataset is obtained from the *Pew Research Center for the People and the Press* (PEW). In January 2000, the PEW administered a survey of potential voters collecting demographic information, ideological preferences of the voter as well as candidates, and perceived voting choices in both primaries and in the general election. The three questions of interest are pertaining to the potential voter's choices in both the Republican and Democratic primaries as well as the General Election, which is contested by Gore, Bush, and Buchanan. In the Democratic primary, the election is between Gore and Bradley. In the Re-

[11] A simple regression of percentage of Democratic vote in 2000 on percentage Democratic vote in 1896 gives a strongly significant negative coefficient, and an $R^2 = 0.37$.

[12] See Acemoglu and Robinson (2001) for the use of a lagged variable as an IV.

publican primary, the election is between Bush and McCain. Voter information about these primaries is our first source of instruments. A candidate who is seeking the office of president must first prevail in his party's primary. Therefore, his ideological position will depend on his primary rival and, potentially, on his rival's ideology in the general election. In the case of Bush, his policy position is affected by both the policy positions of McCain and Gore. On the other hand, Gore's policy position is affected by both the policy positions of Bush and Bradley. In both instances, the candidate who fails to get the party's nomination is a viable instrument for the policy position of the opposing party's nominee. These potential instruments are justified via an exclusion restriction. These candidates are never in the same choice set for a particular voter (Bush does not face Bradley and McCain does not face Gore), but their ideological positions are correlated through their mutual rival (Bush and Bradley are both rivals to Gore).[13] Truly, Bush's position may incorporate Bradley's position and quality if Bush is forward looking, but in January 2000 there is sufficient empirical evidence to suggest Gore was the likely winner of the Democratic primary. According to the January 2000 ABC News/Washington Post Poll, 65.8% of voters believe Bush would win the Republican Primary (McCain receiving 18.3%) and Gore received 66.8% of voter support relative to 26.4% for Bradley in the Democratic Primary.[14]

The second data set contains vote share by FIPS code for the 1896 Presidential election. Miller and Schofield (2003) estimate a simple regression of percentage of Democratic vote in 2000 on percentage Democratic vote in 1896 and obtain a strongly significant negative coefficient and an $R^2 = 0.37$. Clearly, neither the candidates nor the voters of the 2000 election were alive in 1896.

[13] The proposed instruments for candidate ideology are as follows: Bush is instrumented by Bradley, Gore is instrumented by McCain, McCain is instrumented by both Gore and Bradley, Bradley is instrumented by both Bush and McCain.

[14] The vote shares for each primary in the Pew sample state 78% of voters support Gore in the Democratic Primary and 74% of voters support Bush in the Republican primary.

The strong correlation is driven by time invariant preferences that are location specific.[15]

Variables obtained from these two sources are summarized in Table 1. A total of 540 voters are available in the PEW survey. The paper focuses on voters of the two major parties, which drops the total number of observations to 518. In observable characteristics, there are several differences in the average voter profile between candidates, which are statistically significant at the 5% level. Voters who support Bush are more likely to be married, white, and homeowners. Further, Bush supporters view Gore as being more liberal than Gore supporters do. On the other hand, Gore supporters have ideologies that are more liberal than Bush supporters and are more likely to live in a city. In this survey, 314 individuals state they will vote for Bush, which leads to a vote share of 58%.[16][17]

5 Methodology

5.1 Empirical Model

We index elections using n. Each voter is observed to vote in three elections: Democratic primary ($n = 1$), Republican primary ($n = 2$), and General Election ($n = 3$). Each election consists of a choice between only two candidates. All candidates are involved in one primary, but only the winners of the primaries (Gore and Bush) move to the general election. The index j denotes the candidates. To save notation, the values that j takes are election specific, i.e. the

[15] For example, states who are heavily dependent on agricultural products like tobacco and cotton have not changed over time. The welfare of citizens within these states is dependent on these cash crops, thus, policies affecting these crops will influence voting behavior in these states.

[16] The actual vote share in the 2000 election is 47.8% for Bush and 48.4% for Gore. George Bush wins the electoral college.

[17] These means in vote share are consistent with those found using the January 2000 ABC News/Washington Post Poll where 57% of the vote share is given to George Bush when excluding Buchanan.

same individual competing in two different elections is assigned different values. These values are given in the following chart.

n	j	Candidate
1	1	Gore (vs. Bradley)
1	2	Bradley (vs. Gore)
2	3	Bush (vs. McCain)
2	4	McCain (vs. Bush)
3	5	Gore (vs. Bush)
3	6	Bush (vs. Gore)

For example, $j = 1$ denotes Gore in the primary versus Bradley, and $j = 5$ denotes Gore in the general election versus Bush.

The empirical model follows directly from the theoretical model. A voter's utility function is assumed to take the form

$$u_{ijn}(x_i, z_{ij}) = -\beta |x_i - z_{ij}| + \eta_i \theta_j + \lambda_{ij} + \varepsilon_{ijn} \tag{6}$$

where x_i is the voter's ideological position, z_{ij} is candidate j's policy position as perceived by voter i, and η_i is a vector of voter specific traits including: sex, age, education, race, marital status, religion, income, employment, home ownership, union status, and location.[18] The taste preferences for each candidate, θ_j, and the quality, λ_{ij}, are assumed to be identical across elections (implying that $\theta_1 = \theta_5$, $\theta_3 = \theta_6$, $\lambda_{i1} = \lambda_{i5}$, and $\lambda_{i3} = \lambda_{i6}$). A voter's sensitivity to ideological distance is captured by the parameter, β, and is assumed to be the same across all candidates.

There are two unobservable shocks. The candidate's quality shock, λ_{ij},

[18] The squared deviation in ideological space is also considered. These results are found in the appendix.

is modelled as a random effect where $\lambda_{ij} \rightsquigarrow N\left(\lambda_j, \sigma_j^2\right)$. The quality shock is observed by the voter, but unobserved by the econometrician. The unobserved quality shock is potentially correlated with both the candidate's policy position and the voter's ideology. The last term, ε_{ijn}, is assumed to be distributed *i.i.d.* Type I Extreme Value with mean zero and variance $\frac{(\pi\tau)^2}{6}$.[19] The indices i, j, and n represent voters, candidates, and election, respectively. The unknown parameters $\Theta = \left(\beta, \theta_j, \lambda_j, \sigma_j^2\right)$ are estimated using simulated maximum likelihood.

In the empirical model, each voter draws a quality measure for each candidate from the distribution $\lambda_{ij} \rightsquigarrow N\left(\lambda_j, \sigma_j^2\right)$. Conditional on all candidates' unobserved qualities, the voter then chooses candidate j when $u_{ijn}(x_i, z_{ij}|\lambda_{ij}, \eta_i) > u_{ikn}(x_i, z_{ik}|\lambda_{ik}, \eta_i)\ \forall\ k \neq j$. Given the distributional assumption of ε_{ijn}, the probability of selecting candidate j in election n is given by the mixed logit probability [Mcfadden 1973].

$$\Pr(j|\Theta, \lambda_{ij}) = \frac{\exp\left[-\beta\left|x_i - z_{ij}\right| + \theta_j\eta_i + \lambda_{ij}\right)/\tau]}{\sum_k \exp\left[-\beta\left|x_i - z_{ik}\right| + \theta_j\eta_i + \lambda_{ik}\right)/\tau]} \tag{7}$$

Instead of a simple binary choice, the voter's likelihood contribution must capture the voter's joint decision across the three elections. A voter's likelihood contribution conditional on the unobserved quality shock for all candidates is the product of probabilities given by equation (7) over all elections

$$L(y_i|\Theta, \lambda_{ij}) = \prod_{j=1}^{6} \Pr(j|\Theta, \lambda_{ij})^{y_{ijn}}$$

where y_{ijn} takes the value of 1 if voter i chooses candidate j in election n and 0 otherwise, and y_i is a vector summarizing the vote decision in each election for each candidate.

[19] The variance parameter τ is normalized to unity in estimation.

5.2 Identification

There exist several challenges in identifying all the parameters of the model. First, the discrete choice framework only allows for the identification of relative differences in utility. For this reason, the utility received from voting for Bradley is normalized to $u_{i,Bradley} = -\beta\,|x_i - z_{i,Bradley}|$. Note, with the exception of β, all the taste parameters and the unobserved quality shock, λ_{ij}, are set to zero. The scaling parameter of the idiosyncratic error, ε_{ijn}, is set to $\tau = 1$.

Second, the random effect capturing a candidate's quality would typically be identified using panel data over time for the same voter. Jointly estimating a voter's choices over the three elections behaves similarly to observing the same voter over three time periods. The parameters associated with the random effects are identified via variation in vote choice among observationally equivalent voters.[20]

Lastly, the parameter associated with sensitivity to ideological differences, β, is potentially biased. We allow for endogeneity in both voter ideology and candidate's policy position as being correlated with the unobserved candidate quality. Our method to control for endogeneity follows the limited information maximum likelihood approach introduced in Villas-Boas and Winer (1999) and Newey (1985, 1987). We use the following linear equation to estimate the relative distance in ideology between candidates and voters

$$|x_i - z_{ij}| = \alpha_0 + \alpha_1 \eta_i + \alpha_2 W_{ij} + e_{ij} \tag{8}$$

where W is an appropriate set of instruments that are uncorrelated with the regression error, e_{ij}.[21] The error term is assumed to be distributed normal with

[20] McCain's estimates are found with less precision than those for Gore and Bush because McCain participates in only one election. Although the same is true for Bradley, recall that his parameters have been normalized to zero.

[21] Because we normalize parameters with respect to Bradley, Gore and Bradley are instrumented jointly as $|x_i - z_{ij}| - |x_i - z_{i,Bradley}| = \alpha_0 + \alpha_1 \eta_i + \alpha_2 W_{ij} + e_{ij}$

mean zero and finite variance, $\sigma^2_{id,j}$.[22] If both candidate's policy position and voter ideology are independent of candidate quality, then $E\left[e_{ij}\lambda_{ij}\right] = \rho\sigma^2_j\sigma^2_{id,j} = 0$, else at least one variable is endogenous. Therefore, an endogeneity bias is present if $\rho \neq 0$.[23]

The instruments, $W = [W_v, W_c]$, are separated into two groups. Voter specific instruments, W_c, include the vote share for William J. Bryan in the 1896 Presidential election by FIPS code and mean voter ideology excluding voters from the voter $i's$ FIPS code. Candidate specific instruments, W_v, include ideology of rival candidates in the opposing party as perceived by voters *not* in voter i's FIPS (e.g. McCain's ideology instruments for Gore's ideology). The vote share from the 1896 election serves as a proxy for time invariant location specific preferences that are unaffected by a candidate's quality. The second instrument can be seen as a parallel to using rivals firms production as an instrument in the industrial organization literature.[24] No one candidate should take too much of an extremist position in the primary as that stance does not bode well in the general election. Therefore, a rival's policy position captures a sense of cost from deviating too much from the electoral center. When constructing this variable we take particular care in minimizing the effects of micro-targeting. Often, it is observed that local media outlets and TV stations provide advertisements from national candidates who choose a few issues targeted to the region. Only the perceptions of voters outside of voter i's FIPS code are used to construct the instrument, thus minimizing the effect of targeting.[25]

[22] Ideological distance between candidates and voters is always a non-negative number. Given the assumption of a normally distributed error it is possible to have negative predicted values for Ideological distance. We provide estimates in Table 8 where the difference in log distance is used instead. The results remain robust to this specification.

[23] An alternative IV approach is to estimate separate IV models for candidate position, z_{ij}, and voter ideology, x_i, then find the predicted residual as $\widehat{e}_{ij} = |x_i - z_{ij}| - |\widehat{x}_i - \widehat{z}_{ij}|$, but this methods is less efficient because it does not use both set of instruments jointly.

[24] The proposed static model assumes candidates are not forward looking. If candidates are forward looking, then the validity of the candidate specific instruments is weakend because each candidate would then select an ideological position conditional on all rivals' qualities and positions.

[25] Table A1 contains a set of regression estimates capturing the correlation between the

5.3 Estimation

Since there is no closed form solution for the integration of the conditional likelihood function, the parameters of the model are estimated using simulated maximum likelihood (SML). The unconditional likelihood contribution of voter i is

$$\mathcal{L}_i\left(\Theta, \rho, \sigma^2_{id,,j}\right) = f\left(e_{ij}|\alpha, \sigma^2_{id,,j}\right) \int L(y_i|\Theta, \lambda_{ij}) f\left(\lambda_{ij}|\lambda_j, \rho, e_{ij}, \sigma^2_{,j}\right) d\lambda_{ij}$$

where $f(\cdot)$ is the normal density function and the conditional likelihood function, $L(y_i|\Theta, \lambda_{ij})$, is evaluated with respect to the three-dimensional integral over the distribution of unobserved candidate-quality shocks. Note, the distribution from which quality shocks are drawn depends on the realization of the error from the instrumental variables equation, e_{ij}. It is through this mechanism that the endogeneity in β is removed and allows for the consistent estimation of the parameters in the unobserved candidate-quality distribution. Simulation methods are used to approximate the value of the likelihood function by randomly taking R draws from the distribution $f\left(\lambda_{ij}|\lambda_j, \rho, e_{ij}, \sigma^2_{,j}\right)$.[26] These draws are denoted by λ^r_{ij}.[27] The likelihood function is then approximated by the following function

$$\widetilde{\mathcal{L}}_i\left(\Theta, \rho, \sigma^2_{id,,j}\right) = f\left(e_{ij}|\alpha, \sigma^2_{id,,j}\right) \frac{1}{R} \sum L(y_i|\Theta, \lambda^r_{ij})$$

and the parameters that maximize this function are called the SML estimates.

proposed instruments and the endogenous variables.

[26] See Stern (1994) for further discussion on simulation methods.

[27] We use 200 draws of the random shock for each candidate in estimation.

6 Results

The standard logit estimates, which do not control for endogeneity or unobserved heterogeneity, are found in Table 2. These baseline estimates are used to compare the outcomes from models that include instruments and unobserved heterogeneity. Note, the taste coefficients associated with Bradley have been normalized to zero. Hence, the interpretation of the taste parameters are viewed as being relative to Bradley. In the baseline model, voters are found to be sensitive to ideological differences. These results are consistent with previous studies of voting behavior [see Alvarez and Nagler (1998), Schofield and Sened (2006), Quinn and Martin (2002)]. Other factors contributing to voting behavior include race, age, martial status, employment status, and urbanization. All of these variables significantly affect the vote share for Gore at the 1%. Bush's vote share is primarily affected by home ownership status (increases vote share) and union membership (decreases vote share).

The first extension of the baseline model includes the use of unobserved candidate specific shocks. Table 3 provides the estimates of the baseline model including candidate unobserved heterogeneity. The random effects model provides standard deviation estimates, σ_j, that are highly significant. Hence, there is an important amount of unobserved heterogeneity across voters regarding their perceptions of the quality of the candidates. This result may be due to heterogenous beliefs on the part of the population. On the other hand, if one considers the unobserved shock to be a composite of candidate attributes such as moral values and leadership abilities, then the heterogeneity may be driven by voter differences on the relative weight of these characteristics. Clearly, the finding that unobserved heterogeneity is prevalent weakens the appeal of the homogenous quality divergence hypothesis, since the latter builds on the assumption that voters have identical perceptions of the quality of the candidates.

Accounting for unobserved heterogeneity increases the estimate of voter's sensitivity to ideological differences, β, from (-0.4611) to (-0.9210) or an increase of 99.7%. The difference in coefficients between models is significant at the 1%.[28] However, other significant estimates also show an increase of similar magnitude. (For example, the coefficient associated to high school increase from 0.85 to 1.37, and the coefficient associated to homeowner increases from 0.62 to 1.47). The variance of the error, ε_{ijn}, in the baseline model is always necessarily greater than the variance of the error in the model with unobserved heterogeneity. This, coupled with the normalization of $\tau = 1$, makes the mean coefficients of the unobserved heterogeneity model larger than those of the baseline model. The increased size of the coefficients is suggestive evidence that the unobserved error is not only composed of random shocks, but candidate specific shocks play an important role.

A small share of the increase in β may not be due to re-scaling, but to an omitted variable bias. If we observed an individual who is ideologically similar to a candidate, but instead votes for the rival, then it must imply this voter received a very low quality shock from the ideologically closer candidate. Alternatively, if we observe a voter who is ideologically far from the candidate, but the voter still chooses the candidate, then the voter received a very high quality shock. In both instances, the naive estimation fails to account for the unobserved shocks in quality and interprets these actions as low sensitivity to ideological differences.

For all three candidates, we find the unobserved variance to be statistically different than zero. Gore is found to have the largest variance followed by Bush and McCain. Since Gore served as Vice President for eight years, the variation about his quality is likely to be associated to heterogenous judgements rather than uncertainty on the part of the voters. A likelihood ratio test rejects the null hypothesis of all the unobserved variances being equal to zero at the 1%

[28] The Student T statistic on the estimate difference in β across models is 3.84.

level.[29]

Second, the existence of significant unobserved heterogeneity across voters suggests that the heterogenous quality divergency hypothesis may play a role. Indeed, comparing Table 3 and Table 4, we see that using instrumental variables to remove the endogeneity in the position of the candidates yields a much larger in absolute value estimate of the importance in ideological differences. Specifically, β increases from (-0.9210) to (-1.3576) or an increase of 47.4%. The difference in estimates is significant at the 1% level.[30] A simple comparison of the coefficients of Table 3 and Table 4 shows that the increase in beta is not due to re-scaling. In fact, most of the significant coefficients are smaller in magnitude in the IV model with unobserved heterogeneity than in the unobserved heterogeneity only model.[31]

The estimated correlation coefficients, $\rho_{id,j}$, which measure the level of endogeneity between candidate quality and ideological distance, are all found to be positive and statistically significant at the 1% level. A likelihood test rejects the null hypothesis that all the correlation coefficients are equal to zero at the 1% level.[32] Therefore, as the unobservable quality increases so does ideological distance. These results provide further evidence in support of the heterogeneous divergence hypothesis (and contradicts the homogenous divergence hypothesis). Candidates can still obtain the vote from voters who are ideologically distant when those voters perceive the candidate to be of high quality.

To this point we have implicitly adopted the accepted assumption that candidates are strictly office-motivated. One can argue that candidates may also have policy preferences. Under this assumption, the cost of moving away from a candidate's most-preferred position would be a potential confounder in the

[29] The likelihood ratio test gives a test statistic equal to 196.07.
[30] The test statistic is T=-3.647.
[31] For example, age decreases in magnitude from -0.04 to -0.03, homeowner from 1.47 to 1.35 and union from -2.00 to -1.54.
[32] The likelihood ratio test statistic equals 31.5416.

policy positions of candidates. If candidates have exogenously determined most-preferred positions, then moving away from these position to points that maximize candidates' electoral performance may decrease candidates' utilities. A candidate who has a lower cost of deviating from their ideal policy position is capable of being more strategic as is the case with McCain. Therefore, a possible reason we find a heterogenous effect across candidates is that each candidate has a different cost of deviating from their ideal points. Levitt (1996) finds a similar result in the voting record of senators where the senator's ideal policy position is the driving factor behind their vote.

As a robustness check, we provide estimates for two alternative metrics of ideological distance. The first metric uses the squared difference in ideology. Initially, Hotelling (1929) finds an equilibrium in location choice based on linear transportation cost of consumers. D'Aspremont et al. (1979) later show that a unique equilibrium in firm location only exists using quadratic transportation cost. The key difference with these location models and optimal policy position for a candidate is that a firm chooses price and location to maximize profits while a candidate chooses only location (effectively removing the issues associated with the pricing stage). These results are found in Tables 5. These estimates are consistent with the previous results assuming linear transportation. The second metric focuses on the instrumental variables equation. Ideological distance can only take non-negative values, but the disturbance term is assumed to be distributed normal. In this case, the linear regression line may predict negative values of the ideological distance and potentially bias the estimates of both $\rho_{id,j}$ and β. The instrumental variables equation is modified by using the natural logarithm of ideological distance, $\log\left(|x_i - z_{ij}| + 1\right)$, allowing negative predicted values to represent positive ideological distances. The natural logarithm of ideological distance is also used in the voter's utility function. The voter's

taste parameter for ideological distance, β, is interpreted as an elasticity within this model. The model's estimated coefficients are found in Table 6. Again, the correlation coefficients, $\rho_{id,j}$, are all found to be positive and statistically significant suggesting that ideological distance remains endogenous.

Next, we conduct the following exercise to identify the existence of both voter endogeneity and candidate endogeneity. The instrumental variables model is estimated twice under different assumptions. First, the model is estimated only using candidate specific instruments to remove the endogeneity in ideological distance. Then, the model is estimated using only voter specific instruments for the measure of ideological distance. In each case, all the parameters in the utility function are estimated. These estimates from this exercise are found in Tables 7.[33] When only candidate specific instruments are used the estimate for β increases by more than the coefficient found when using both types of instruments. In addition, the correlation coefficients for each candidate increases and remain statistically significant at the 1%. The candidate only instruments demonstrate how a naive estimation *underestimates* the ideology sensitivity parameter. This reinforces the hypothesis that candidates do strategically interact based on their relative qualities when choosing policy positions. When only voter specific instruments are used only one correlation coefficient can be identified because the instruments do not vary by candidate. Therefore, we force all the candidates to have the same correlation coefficient. The estimate for β decreases by more than the coefficient found when using both types of instruments. The correlation coefficient is negative in this setup. The estimate suggests as a candidate's perceived quality increases the relative distance in ideology between voter and candidate decreases. The voter only instruments demonstrate how a naive estimation *overstates* a voter's sensitivity to ideological differences, which shows support for the deliberation hypothesis. This result

[33] Unobservable Heterogeneity is estimated in all models.

suggests high quality candidates are better at persuading voters than their lower quality rivals of what the ideal policy position is. Given these point estimates we find candidate endogeneity dominates voter endogeneity.

	Unobserved Heterogeneity Model	IV both	IV: candidate only	IV: Voter only
β	-0.9210	-1.3576	-1.4772	-0.5572

Lastly, we seek to provide further evidence of the heterogenous divergence hypothesis by estimating the full model on a sub-sample of voters. The heterogenous divergence hypothesis should be more prevalent among swing voters. The distribution of voters ideology and mean candidate ideology are illustrated in Figure 1. Given this distribution of voter ideology, we consider the voters located at 3 and 4 as swing voters because they are located between the potential presidential candidates. If these voters are removed from the voting population, then candidates have less of an incentive to microtarget and the estimated correlation coefficients become less important. The full model is estimated removing the swing voters (those with ideological positions at 3 and 4) from the sample. These estimates are found in Table 7. Although, all the correlation coefficients are found to be positive, which is in support of the heterogeneous divergence hypothesis, none are statistically different from zero. The absence of swing voters lessens the incentive to microtarget because voter who are ideologically close to you are sufficiently far from your rival and remain as strong supporters.

7 Conclusion

The outcome of a democratic election depends on the ideological stances of the voters and the candidates. In the democratic game, candidates undertake

the dual task of adopting optimal ideological stands and persuading voters that their positions are better than their rivals'. Our main conclusion is that both the voters' and the candidates' ideological stances are the result of a complex game whose primitives are the voters' perceptions of candidates' qualities. Two effects are observed and measured. First, the candidates personalize their messages to the voters. Since the personalization of the message is economically costly, the candidates choose the optimal degree of personalization based on the voters' perception of the candidate's quality. In particular, candidates do not waste resources trying to persuade voters that are already likely to vote for them on non-ideological grounds. They save those resources to deliver a personalized message to those voters that are less likely to vote for them based on non-ideological grounds.

The second effect is that the ideological stances of the voters are highly dependent on the position of the candidates, which in turn depend on their qualities. High quality candidates are more likely to persuade voters that their position is the ideal one relative to their lower-quality rivals. These two strategies have opposing effects on the estimated parameter capturing sensitivity to ideological distance. Voter endogeneity is found to overstate the value of ideological differences to a voter's utility. Candidates endogeneity is found to underestimate the value of ideological difference. The latter effect dominates the former causing a naive estimation to underestimate a voter's sensitivity to ideological differences.

8 APPENDIX

Proof of Proposition. Voter 1 supports L. Voter 4 supports L if voter 3 supports L. Voter 5 supports R. It follows that $\rho_L(b_L, b_R) = \Pr[2 \text{ votes } L \cap 3 \text{ votes } L | b_L, b_R]$. Because ε enters additively in both $u_{2L} - u_{2R}$ and $u_{3L} - u_{3R}$, $\rho_L(b_L, b_R) = \Pr[\varepsilon > \max\{-\Delta_L u^o_{2L}, -\Delta_L u^o_{3L}\}]$. Equivalently, $\rho_L(b_L, b_R) = \Pr[\varepsilon > -\min\{\Delta_L u^o_{2L}, \Delta_L u^o_{3L}\}]$. Hence, for $b^*_L = \arg\max_{b_L}\{\min\{\Delta_L u^o_2, \Delta_L u^o_3\}\}$, $\rho_L(b^*_L, b_R) > \rho_L(b_L, b_R)$ for any $b_L \neq b^*_L, b_R$. Symmetric argument shows that, for $b^*_R = \arg\max_{b_R}\{\min\{\Delta_R u^o_3, \Delta_R u^o_4\}\}$, $\rho_R(b_L, b^*_R) > \rho_L(b_L, b_R)$ for any $b_R \neq b^*_R, b_L$. This proves b^*_L, b^*_R are strict dominant strategies. Hence, b^*_L, b^*_R is the unique Nash equilibrium. QED ■

Table1: Descriptive Statistics

	Means by Vote			
Variables	Gore	Bush	Other	Total
Bryan Vote Share	0.5156 (0.1579)	0.5249 (0.1634)	0.5105 (0.1406)	0.5208 (0.1603)
Sex	0.4804 (0.5008)	0.4427 (0.4975)	0.4091 (0.5032)	0.4556 (0.4985)
Gore Ideology	3.8137 (1.3590)	4.2739 (1.5256)	3.4091 (1.4362)	4.0648 (1.4813)
Bush Ideology	2.8039 (1.3828)	2.9045 (1.2903)	3.3636 (1.4325)	2.8852 (1.3338)
Bradley Ideology	3.7402 (1.1936)	3.8121 (1.3255)	3.4091 (1.2968)	3.7685 (1.2763)
McCain Ideology	3.0882 (1.2603)	2.9777 (1.1317)	3.0455 (1.2527)	3.0222 (1.1857)
Voter Ideology	3.7941 (1.3742)	2.8631 (1.2952)	3.0455 (1.7037)	3.2222 (1.4138)
Age	45.74 (16.50)	45.26 (17.30)	43.36 (19.57)	45.36 (17.07)
HS	0.2884 (0.4530)	0.2277 (0.4193)	0.4348 (0.4957)	0.2593 (0.4382)
College	0.5070 (0.4999)	0.5538 (0.4971)	0.5217 (0.4995)	0.5346 (0.4988)
MA	0.1488 (0.3559)	0.1723 (0.3776)	0 (0)	0.1563 (0.3631)
Hispanic	0.0637 (0.2449)	0.0541 (0.2267)	0 (0)	0.0556 (0.2293)
White	0.7255 (0.4474)	0.9076 (0.2900)	0.7273 (0.4558)	0.8315 (0.3747)
Married	0.4755 (0.5006)	0.6752 (0.4691)	0.4545 (0.5096)	0.5907 (0.4922)
Catholic	0.2402 (0.4283)	0.2452 (0.4309)	0.1364 (0.3513)	0.2389 (0.4268)
Unemployed	0.3116 (0.4632)	0.3169 (0.4653)	0.3043 (0.4601)	0.3144 (0.4643)
Income	37534 (29010)	42852 (42958)	29348 (30007)	40293 (29903)
Homeowner	0.6373 (0.4820)	0.7675 (0.4231)	0.6818 (0.4767)	0.7148 (0.4519)
Union	0.1814 (0.3863)	0.1051 (0.3072)	0.1364 (0.3513)	0.1352 (0.3422)
City	0.2941 (0.4568)	0.1624 (0.3694)	0.0909 (0.2942)	0.2093 (0.4072)
Suburb	0.2304 (0.4221)	0.2930 (0.4559)	0.2273 (0.4289)	0.2667 (0.4426)
N	204	314	22	540

Note - standard deviation is found in parenthesis

Table 2: Baseline Model

Variables	Coef			SE		
Ideology	-0.4611***			0.0314		
	Bush		Gore		McCain	
	Coef	SE	Coef	SE	Coef	SE
Constant	-0.2370	0.5357	0.2110	0.3827	-0.9829	0.6436
Sex	0.1796	0.2232	-0.0460	0.1531	-0.0830	0.2680
Age	-0.0113	0.0074	0.0117**	0.0051	-0.0003	0.0088
High School	0.8551**	0.4022	0.8501***	0.2865	0.0717	0.4852
College	0.3546	0.3844	0.1926	0.2733	0.1227	0.4609
Masters	0.3024	0.4584	0.1541	0.3222	0.2065	0.5498
Hispanic	0.3198	0.4654	-0.1887	0.3212	-0.6704	0.6002
White	-0.3115	0.3296	-1.4471***	0.2400	0.0023	0.3965
Married	0.2268	0.2593	-0.5087***	0.1795	0.3442	0.3131
Catholic	-0.3215	0.2643	-0.4928***	0.1832	-0.3089	0.3189
100min	-0.0018	0.4411	-0.4140	0.3018	-0.1017	0.5272
Income	0.0061	0.0047	0.0010	0.0032	0.0040	0.0057
Unemployed	-0.0972	0.2697	-0.4403***	0.1849	-0.2331	0.3223
Homeowner	0.6207**	0.2943	0.3515*	0.2057	0.4018	0.3559
Union	-0.7050**	0.3232	0.2925	0.2220	-0.0831	0.3884
City	0.4666	0.2931	0.8251***	0.2032	0.5291	0.3530
Suburb	0.2606	0.2571	0.6176***	0.1754	0.4453	0.3089
$\sigma_{ideology}$	1.2583***	0.0261	1.4688***	0.0305	1.1566***	0.0240
LL	7430.75					

Note - Bradley's parameters are normalized to zero; *** = 1% level ; ** = 5% level; *=10% level

Table 3: Model with Unobserved Heterogeneity

Variables	Coef				SE	
Ideology	-0.9210***				0.1155	
	Bush		Gore		McCain	
	Coef	SE	Coef	SE	Coef	SE
Constant	-0.6243	1.0662	0.6419	0.7365	-3.0928**	1.3559
Sex	0.4286	0.4354	-0.1601	0.2940	-0.2460	0.4935
Age	-0.0462***	0.0161	0.0210**	0.0098	-0.0125	0.0168
High School	1.3728*	0.7984	1.4387***	0.5618	-0.6348	0.9375
College	0.8335	0.7725	0.1504	0.5213	0.1542	0.8459
Masters	0.5891	0.9079	0.0466	0.6150	0.2606	1.0157
Hispanic	0.7540	0.8662	-0.1757	0.6126	-1.0802	1.0490
White	0.5390	0.6713	-2.7979***	0.5274	1.4641*	0.8335
Married	1.2424**	0.5508	-1.0748***	0.3600	1.4930***	0.6224
Catholic	-0.4538	0.5231	-1.1395***	0.3723	-0.4540	0.5998
100min	0.2565	0.8850	-0.8180	0.5753	0.1841	0.9778
Income	0.0145	0.0093	0.0031	0.0061	0.0104	0.0105
Unemployed	0.4613	0.5311	-0.7563**	0.3499	0.1107	0.5930
Homeowner	1.4741***	0.5822	0.8229**	0.4051	1.0468	0.6649
Union	-2.0094***	0.6696	0.5219	0.4342	-0.4586	0.7353
City	0.4138	0.5801	1.4521***	0.4078	0.6754	0.6682
Suburb	0.3338	0.5086	1.2626***	0.3700	0.9183	0.5931
$\sigma_{ideology}$	1.2583***	0.0261	1.4688***	0.0305	1.1566***	0.0240
$\sigma_{Candidate}$	2.8872***	0.4761	2.5748***	0.3485	2.4115***	0.8045
LL	7332.71					

Note - Bradley's parameters are normalized to zero; *** = 1% level ; ** = 5% level; *=10% level

Table 4: IV Model with Unobserved Heterogeneity

Variables	Coef				SE	
Ideology	-1.3576***				0.1817	
	Bush		Gore		McCain	
	Coef	SE	Coef	SE	Coef	SE
Constant	-0.6050	0.9629	0.5238	0.7401	-1.8881*	1.0413
Sex	0.4517	0.3904	-0.1587	0.2897	-0.1425	0.4112
Age	-0.0371***	0.0139	0.0193**	0.0096	-0.0219	0.0142
High School	1.7239***	0.7359	1.6755***	0.5594	0.4853	0.7718
College	1.0656	0.7040	0.4510	0.5270	0.6868	0.7238
Masters	0.7425	0.8225	0.3245	0.6137	0.6359	0.8578
Hispanic	0.9761	0.7763	-0.2550	0.6078	-0.4401	0.8783
White	-0.0276	0.5966	-2.5535***	0.4976	0.7400	0.6570
Married	0.7297	0.4687	-1.0783***	0.3488	1.0958**	0.4934
Catholic	-0.5602	0.4697	-1.2050***	0.3617	-0.5873	0.4973
100min	0.1086	0.7886	-0.9039	0.5678	-0.1609	0.8130
Income	0.0128	0.0083	0.0023	0.0060	0.0086	0.0087
Unemployed	0.2718	0.4797	-0.7100**	0.3442	-0.0054	0.5028
Homeowner	1.3556***	0.5243	0.7703**	0.3917	1.0393*	0.5529
Union	-1.5457***	0.5799	0.4920	0.4249	-0.5506	0.6024
City	0.8758*	0.5314	1.3231***	0.3956	0.7535	0.5549
Suburb	0.5215	0.4591	1.1668***	0.3531	0.7922	0.4843
$\sigma_{ideology}$	1.2583***	0.0261	1.4688***	0.0305	1.1566***	0.0240
$\sigma_{Candidate}$	2.3160***	0.2811	2.5629***	0.2893	1.3452***	0.3301
$\rho_{ideology,Candidate}$	0.3710***	0.1003	0.2144***	0.0919	0.9717***	0.1619
LL	7316.94					

Note - Bradley's parameters are normalized to zero; *** = 1% level ; ** = 5% level; *=10% level

Table 5: Quadratic Model

Variables	Baseline Model		Unobserved Hetrogeneity		IV	
	Coef	SE	Coef	SE	Coef	SE
Ideology	-0.0941***	0.0078	-0.1636***	0.0219	-0.2684***	0.0438
Bush						
$\sigma_{ideology}$	5.5029***	0.1142	5.4959***	0.1139	5.5047***	0.1143
$\sigma_{Candidate}$			2.5656***	0.4168	2.4042***	0.2822
$\rho_{ideology,Candidate}$					0.3390***	0.1032
Gore						
$\sigma_{ideology}$	6.2812***	0.1304	6.2856***	0.1305	6.2862***	0.1306
$\sigma_{Candidate}$			2.4470***	0.2950	2.5559***	0.2832
$\rho_{ideology,Candidate}$					0.1866*	0.1004
McCain						
$\sigma_{ideology}$	4.6489***	0.0965	4.6502***	0.0965	4.6469***	0.0964
$\sigma_{Candidate}$			0.9536	1.4109	1.0746***	0.3112
$\rho_{ideology,Candidate}$					0.9132***	0.1783
LL	12486.31		12378.70		12368.84	

Note - Bradley's parameters are normalized to zero; *** = 1% level ; ** = 5% level; *=10% level

Table 6: Log Distance - IV

Variables	Coef			SE		
Ideology	-3.2797***			0.4424		
	Bush		Gore		McCain	
	Coef	SE	Coef	SE	Coef	SE
Constant	-0.6050	0.9849	0.3531	0.7410	-2.0039*	1.1462
Sex	0.5362	0.4038	-0.2411	0.2943	-0.1589	0.4347
Age	-0.0423***	0.0148	0.0166*	0.0098	-0.0224	0.0149
High School	1.6346**	0.7503	1.9312***	0.5818	0.1414	0.8218
College	0.9849	0.7178	0.6916	0.5386	0.4877	0.7513
Masters	0.6901	0.8414	0.5754	0.6263	0.5040	0.8960
Hispanic	0.8858	0.7996	-0.2304	0.6095	-0.7129	0.9271
White	0.0187	0.6215	-2.5614***	0.5054	0.8052	0.7206
Married	0.6768	0.4925	-1.2336***	0.3568	0.9937*	0.5267
Catholic	-0.4748	0.4823	-1.2292***	0.3707	-0.6563	0.5241
100min	0.2274	0.8111	-0.9281	0.5807	-0.1168	0.8516
Income	0.0149*	0.0086	0.0035	0.0061	0.0121	0.0092
Unemployed	0.4688	0.5008	-0.5901	0.3482	0.1724	0.5296
Homeowner	1.4486***	0.5442	0.8392**	0.3988	1.1703	0.5870
Union	-1.4626***	0.6019	0.5430	0.4327	-0.5064	0.6346
City	0.7156	0.5431	1.2830***	0.4016	0.6148	0.5835
Suburb	0.4224	0.4730	1.0875***	0.3604	0.8398	0.5145
$\sigma_{ideology}$	0.5334***	0.0111	0.6312***	0.0131	0.5072***	0.0105
$\sigma_{Candidate}$	2.6405***	0.3120	2.3974***	0.3376	1.8481***	0.5715
$\rho_{ideology,Candidate}$	0.3322***	0.1074	0.2354***	0.0885	0.8017***	0.2166

Note - Bradley's parameters are normalized to zero; *** = 1% level ; ** = 5% level; *=10% level

Table 7: Different IV Specifications

	Candidate IV only[1]		Voter IV only[2]		No Swing Voters[3]	
Variables	Coef	SE	Coef	SE	Coef	SE
Ideology	-1.4772***	0.1739	-0.5572***	0.0219	-0.9894***	0.2339
$\rho_{ideology,voter}$			-0.2151***	0.0444		
Bush						
$\sigma_{ideology}$	1.2136***	0.0252	1.2635***	0.0263	1.2583***	0.0261
σ_{Bush}	2.3640***	0.2765	2.3546***	0.2888	2.2259***	0.4854
$\rho_{ideology,Bush}$	0.4776***	0.0842			0.1151	0.1636
Gore						
$\sigma_{ideology}$	1.4582***	0.0303	1.9504***	0.0403	1.4688***	0.0305
σ_{Gore}	2.6904***	0.2993	2.4487***	0.2795	2.1578***	0.4204
$\rho_{ideology,Gore}$	0.2618***	0.0787			0.0993	0.1445
McCain						
$\sigma_{ideology}$	1.1299***	0.0234	1.1574***	0.0240	1.1566***	0.0240
σ_{McCain}	1.4175***	0.2521	1.4E-06	0.0008	1.0341	1.1368
$\rho_{ideology,McCain}$	0.9732***	0.0829			0.5897	0.6836

Note - Bradley's parameters are normalized to zero; *** = 1% level ; ** = 5% level ; * = 10% level
Controls: sex, age, education, income, religion, race, employment status, marital status, and location
[1]instruments: ideological positions of rivals in the opposing party's primary
[2]instruments: vote share from 1896 election, avg. voter ideology from other voting markets
[3]the full model is run on a sub-sample of voters who have extreme ideological preferences

Table A1: Relationship between Instruments and Ideology Measures

	Dependent Variables				
	Voter	Gore	Bush	Bradley	McCain
McCain[1]	-	-16.01**	-	-9.73	-
		(8.02)		(7.16)	
Bradley[1]	-	-	10.65**	-	-2.94
			(4.63)		(6.66)
Bush[1]	-	-	-	8.26	-
				(5.40)	
Gore[1]	-	-	-	-	-0.355
					(4.51)
Bryan vote share	0.797	0.899	-0.658	0.552	0.722*
in 1896[2]	(0.518)	(0.605)	(0.521)	(0.517)	(0.472)
Bryan vote share	26.35**	31.33	-33.15**	2.12	4.91
in 1896[1]	(10.87)	(20.36)	(14.76)	(17.92)	(13.51)
Voter	-6.48***	8.93*	-6.33*	1.29	2.97
Ideology[1]	(2.52)	(4.93)	(3.88)	(4.82)	(3.52)
Constant	10.43	6.38	1.35	3.45	3.40
	(7.38)	(7.98)	(7.24)	(6.84)	(6.57)
R^2	7.13%	7.01%	7.10%	8.75%	3.47%

Note -[1]uses information from outside voter's FIPS location;
[2]uses information from within voter's FIPS location
voters socio-demographic variables are used in all regresssions
standard errors in parentheses; *** 1% level; ** 5% level; * 10% level

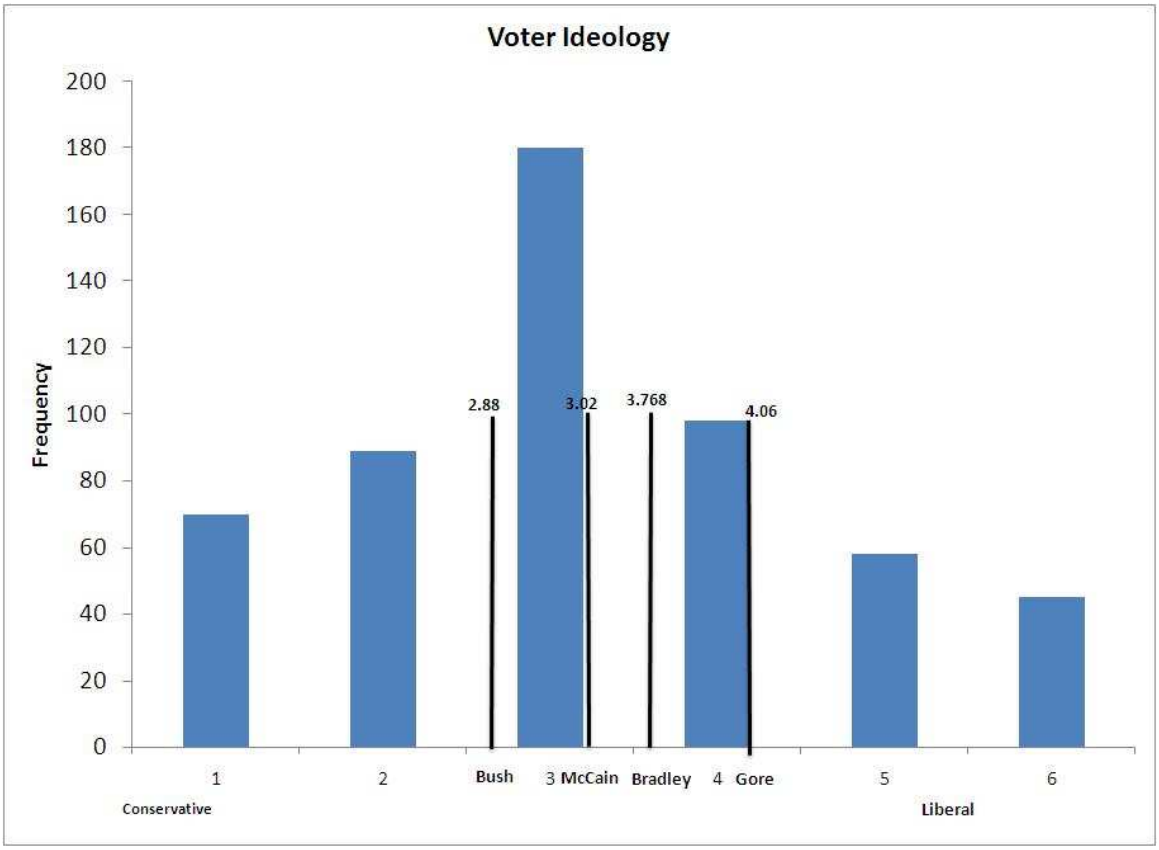

Figure 1 - Histogram of voter ideology and mean perception of candidates' policy positions.

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