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"One Man, One Dollar"? Campaign contribution limits, equal influence, and political communication ☆

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Abstract

Arguably the most important campaign finance regulations in U.S. federal elections are limits imposed on individual campaign contributions. One of the principal arguments in support of these contribution limits has been that they equalize the influence of individual donors and thereby cause candidates' aggregate financial resources to more accurately reflect public support. I construct a formal model to evaluate this argument. The analysis shows that a necessary condition for it to apply is that a candidate's reliance on large contributions is negatively related to voter-preferred characteristics which cannot be credibly revealed through campaign advertisements. Using data on elections to the House of Representatives between 1992 and 2000, I find no evidence that such a relationship exists. This result casts doubt on the equalization argument in support of campaign contribution limits.

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1. Introduction

Since passage of the Federal Election and Campaign Act of 1971, the regulation of campaign finance in the United States has been a controversial and much debated issue. Over the past three decades, a series of Supreme Court rulings and further reforms have established a set of regulations defining permissible behavior for individuals and organizations who contribute or spend money with the intention of affecting the outcome of a federal election. Although the regulation of campaign finance has enjoyed wide public support, the objectives being pursued, as well as the practical effects of the regulations in place, have remained matters of controversy.

Arguably the most important of these regulations are limits imposed on the amount that an individual or organization may donate to a federal campaign. For example, during the period I investigate in this essay, individuals were permitted to contribute at most $1000 to a congressional candidate per election.[1] A principal argument in support

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[1] The Bipartisan Campaign Reform Act of 2002 raised the limit on individual contributions to $2000 in order to adjust for inflation. Current law also imposes limits on contributions to and from Political Action Committees (PACs) and parties.

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of contribution limits has been that they equalize the influence of individual donors and thereby cause candidates' aggregate resources to more accurately reflect public support. For example, a recently published brochure advocating lower contribution limits argues that "contribution limits should be set at a level that every American can afford. If candidates were raising most of their money from average constituents, fund- raising might not be such a corrupting influence (…). The candidate with the most local grassroots support would tend to raise the most money — and win most elections" (PIRG, 2006). I refer to this as the equalization argument in support of campaign contribution limits. The aim of this paper is to theoretically and empirically evaluate this argument.[2]

In a landmark ruling on the constitutionality of the FECA regulations (Buckley v. Valeo, 1976), the Supreme Court summarized the equalization argument as saying that contribution limits "serve to mute the voices of affluent persons and groups in the election process and thereby to equalize the relative ability of all citizens to affect the outcome of elections" [424 U.S. 1, 25]. Initially, it appeared to reject this argument, stating that "the concept that government may restrict the speech of some elements of society in order to enhance the relative voices of others is wholly foreign to the First Amendment" [424 U.S. 1, 49]. It argued that the only legitimate purpose of contribution limits is to combat "corruption" [424 U.S. 1, 26–27]. However, the Court also indicated that it considered an equalization of donor influence to be an ancillary benefit of contribution limits. In particular, it predicted that "given the limitation on the size of outside contributions, the financial resources available to a candidate's campaign (…) will normally vary with the size and intensity of the candidate's support" [424 U.S. 1, 56]. This argument foreshadowed the later development of the Court's position. Legal scholars now agree that "over the years, the Supreme Court's anti-corruption rationale has transformed into something close (or even identical) to the equalization rationale that was originally rejected in Buckley v. Valeo" (Dawood, 2006). According to the dissenting voice of Justice Scalia, the Court's position now "rests upon that proposition whose violation constitutes the 'New Corruption': Expenditures 'must reflect actual public support for the political ideas espoused '" [494 U.S. 652, 693].

The ambiguity of the Court's position has contributed to a situation in which the two arguments (anti-corruption and equalization) are no longer clearly distinguished from one another, and the practical logic underlying the equalization argument is rarely explicitly stated or thoroughly investigated.[3] In Section 2, I construct a formal model in order to investigate this practical logic and to identify a set of conditions necessary for the equalization argument to apply. The model assumes that contributions are used to pay for campaign advertisements. I distinguish between advertisable candidate characteristics, which can be credibly revealed by such advertisements, and unadvertisable characteristics, which cannot. The analysis shows that the equalization argument rests upon the assumption that a candidate's reliance on large contributions is negatively related to voter-preferred unadvertisable characteristics. Under this condition, a contribution limit may increase the correlation of candidate resources and unadvertisable quality. This would cause a candidate's ability to advertise to reflect and thus implicitly reveal her otherwise unadvertisable qualities. Voters would benefit to the extent that unadvertisable characteristics are more important than advertisable characteristics (in a sense that will be made more precise below).

Thus, the central assumption underlying the equalization argument is that 'better' candidates rely less heavily on large contributions. This is difficult to test directly, since to do so we would need to identify an observable measure of candidate quality. However, the formal analysis suggests an indirect way of testing the equalization argument. Specifically, it demonstrates that the underlying assumptions generate a testable implication about the relationship between electoral success and the composition of a candidate's campaign budget. In other words, if the equalization argument applies, electoral success should be related not just to the aggregate size but also to the composition of a candidate's campaign budget. Specifically, holding aggregate levels of spending constant, a candidate's electoral success should be negatively (positively) related to her (her opponent's) reliance on large contributions. Thus, the existence of such a relationship constitutes a directly testable implication of the equalization argument. To my knowledge, this implication has not been previously investigated. In Section 3, I use data on elections to the House of Representatives held between 1992 and 2000 to conduct such an investigation. I find no evidence to support the relationship implied by the equalization argument. In fact, the empirical evidence suggests that 'better' candidates rely

[2] The imposition of campaign contribution limit raises important constitutional questions, especially regarding its compatibility with the First Amendment. These issues are not discussed here. For a discussion, see Vanberg (2005).

[3] For a discussion of this situation and its unfortunate impact on the debate over campaign finance policy, see Rosenkranz and Hasen (1999), who observe that "Buckley leaves us with a jurisprudential landscape that forces proponents of reform to cast their proposals as anti-corruption devices rather than as measures to equalize political power. (…) It is no surprise, therefore, that scholarly literature has largely ignored the intersection of money, politics, and equality."

more heavily on large contributions. This result casts doubt on the equalization argument in support of campaign contribution limits. Section 4 concludes. Proofs are contained in the Appendix.

2. A model of the equalization argument

There is by now an extensive formal literature seeking to understand the impact of campaign contributions and campaign finance regulations on electoral competition and interest group influence (Ashworth, 2006; Austen-Smith, 1987; Baron, 1994; Coate, 2004a,b; Gerber, 1996; Grossman and Helpman, 1996; Potters et al., 1997; Prat, 2000, 2002). A detailed review of this literature is beyond the scope of this essay (see Ashworth, in press; Prat, 2004). Suffice it to say that previous work has approached the problem from an aggregate perspective, treating donor groups as unitary actors, and assuming that they represent an exogenously fixed (combination of) interests. Given this, previous authors have discusses the trade-offs involved in regulating the aggregate amount of money that candidates are permitted to raise and spend. Existing studies have therefore considered only spending limits and public financing as policy options.

To my knowledge, this paper is the first to formally analyze the specific effects of a campaign contribution limit. In contrast to a spending limit, the aim of this policy is not to regulate the aggregate amount of money being raised and spent. Instead, it is to regulate the composition of a candidate's campaign budget in a way that causes the aggregate amounts collected and spent by different candidates to reflect their degree of public support.

Examining this somewhat more subtle argument is interesting for both practical and theoretical reasons. From a practical point of view, it is important to understand the implicit assumptions of an argument that underlies much of the public support for existing regulations. From a theoretical point of view, the equalization argument is interesting because it can be viewed in a broader context as an argument about how the social value of a communication technology depends on the circumstances and rules under which the resources necessary for its use are accumulated.

Previous models of campaign finance can be distinguished according to assumptions made about the motivation of donors and about the way in which campaign spending influences voter behavior. With respect to donor motivation, the literature distinguishes between a 'service' motive and an 'electoral' motive. Service motivated donors contribute in order to obtain political favors, while electorally motivated donors contribute to candidates who share their political preferences. While the former corresponds closely to the *quid-pro-quo* concept of corruption, the latter reflects the concept of 'new corruption' that is at the heart of the equalization argument. The analysis below will be based on the assumption that donors are electorally motivated. This reflects the fact that I am interested in analyzing the equalization rationale for campaign contributions.

Likewise, two approaches have been used to explain the effect of campaign spending on voter behavior. The first assumes that money can buy influence over 'impressionable' voters (e.g. Baron, 1994; Grossman and Helpman, 1996). In such models, the effectiveness of campaign spending is exogenously assumed rather than explained. Another approach assumes that voters are imperfectly informed and react rationally to information made available as a result of campaign spending. The first models in this category were based on a pure signaling logic: candidates 'burn money' and voters observe the amounts being burned. If the ability to collect contributions is related to characteristics that voters prefer, burning money constitutes a positive signal that increases a candidate's chance of winning the election (Gerber, 1996; Potters et al., 1997; Prat, 2000, 2002). A generalization of this signaling approach was independently proposed by Coate (2004a,b) and Ashworth (2006), who assume that candidates spend money in order to literally send messages (advertisements) to voters. These messages may constitute mere cheap talk, in which case the approach is (essentially) equivalent to money burning. However, they may also contain verifiable information about candidate characteristics which voters care about.

The model I develop below builds on this message-sending approach.[4] I introduce two key innovations relative to previous work. First, I consider two- dimensional candidate types. One dimension represents an 'advertisable' (verifiable) characteristic and the other represents an 'unadvertisable' (non-verifiable) characteristics. This distinction allows me to discuss the different effects of campaign finance policy on explicit (verifiable) vs. implicit (money

[4] There are a number of reasons why a framework similar to Baron (1994) is ill suited for the purpose at hand. Most importantly, it is inconsistent with the Supreme Court's view that campaign spending translates into political communication. While the credibility of campaign advertisements may be called into question, it is simply a fact that candidates spend money in order to communicate with voters. Baron's framework precludes a discussion of the issues raised by this observation. The main substantive conclusion of the analysis (Proposition 1, point 3) would certainly extend to Baron's framework.

burning) aspects of communication. I demonstrate that the optimal policy depends on the relative importance of these two types of communication, i.e. on the value of information about advertisable vs. unadvertisable candidate characteristics. Second, I introduce heterogeneity among candidates with respect to the size of the individual contributions they collect. This is a necessary component of a model that seeks to understand the impact of a contribution limit.

The model assumes that candidates who exhibit a voter-preferred advertisable characteristic can send a campaign message that credibly reveals this to voters. Possible examples of advertisable characteristics include verifiable facts about a candidate's personal and political history (e.g. "Candidate X served in the military"). I assume that a candidate needs to spend a certain amount of money to send such a message. This money must be acquired by soliciting contributions from donors. Candidates of different types are assumed to differ in the number of donors to whom they have access. Those with access to a smaller base of donors must rely on larger contributions. The size of a candidate's donor base may be related to her 'unadvertisable' characteristic.[5] Examples of unadvertisable characteristics include elements of a candidate's future policy agenda (e.g. "Candidate X plans to grant subsidies to peanut farmers") and personal characteristics that are difficult to verify (honesty, etc.).

The analysis shows that the equalization argument in support of contribution limits applies only if two conditions are satisfied. The first is that a candidate's reliance on large contributions is negatively related to voter-preferred but unadvertisable characteristics. For example, candidates who collect large contributions may be more likely to serve 'special interests,' and 'truly popular' candidates may be unable to credibly distinguish themselves through advertisements. The second is that these unadvertisable characteristics are more important to voters than characteristics which can be credibly revealed. Although these conditions are difficult to test directly, I show that they generate a testable implication.

2.1. Setup

2.1.1. Candidates

We imagine a political community (e.g. a congressional district) that is going to hold an election. There are two candidates, put forth by political parties labeled $j \in \{D, R\}$ (i.e. 'Democratic' and 'Republican'). Each candidate is characterized by an ideology $i_j \in \{0, 1\}$ as well as two 'nonpartisan' characteristics, labeled $q_{ja} \in \{0, 1\}$ and $q_{ju} \in \{0, 1\}$. Party D's candidate always has ideology 0, party R's candidate always has ideology 1. The nonpartisan characteristics q_a and q_u are randomly assigned by nature. It is assumed for simplicity that they are independently drawn from the same prior distribution for both candidates.[6] The probability that a candidate is of type (q_a, q_u) is denoted $\sigma(q_a, q_u)$.

When $q_a = 1$, the candidate has a favorable (i.e. voter-preferred) 'advertisable' characteristic, and she can send a costly message (e.g. a television advertisement) that reveals this to voters. Candidates who lack positive advertisable characteristics (denoted $q_a = 0$) cannot send such a message. In contrast, $q_u \in \{0, 1\}$ denotes an 'unadvertisable' characteristic. Intuitively, the unadvertisable characteristic can be interpreted as anything of importance which cannot be credibly revealed through campaign communication. Without loss of generality, I assume that $q_u = 1$ denotes an unfavorable characteristic. A possible interpretation of this setup is that a candidates with $q_u = 1$ has 'something to hide'. I will therefore refer to $q_u = 1$ as denoting a 'special interest' (as opposed to a 'public interest') candidate. However, this interpretation is not essential to the argument.

2.1.2. Voters

Voters are characterized by separable preferences over the winning candidate's ideology and her non-ideological characteristics. A voter's ideology is a location $i \in (0, 1)$ representing his proximity to the two parties located at 0 and 1.[7] If party D's candidate is elected, the voter incurs a loss equal to i. If party R's candidate is elected, he incurs a loss of $(1-i)$. Voter ideology i is uniformly distributed on an interval $[\mu-\tau, \mu+\tau] \subset (0, 1)$. The median voter's ideology, μ, is ex ante uncertain and determined by a random draw from a uniform distribution on $\left[\left(\frac{1}{2} - \varkappa\right) - r, \left(\frac{1}{2} - \varkappa\right) + r\right]$. Thus,

[5] The underlying cause of this correlation is not relevant for an evaluation of the argument and will therefore not be explicitly modeled.

[6] The model can be extended to relax this and other symmetry assumptions introduced below. This does not affect the substantive conclusions derived (see Appendix).

[7] Throughout, I will use the pronoun "he" when referring to a voter and "she" when referring to a candidate.

the expected location of the median voter is $\frac{1}{2} - \varkappa$. Intuitively, the parameter $\varkappa$ measures the strength of party D in the district.

In addition to ideology, voters care about candidates' advertisable and unadvertisable characteristics. If the winner of the election is of type (q_a, q_u), all voters receive a net transfer equal to $u(q_a, q_u)$. I refer to $u(q_a, q_u)$ as the voters' nonideological payoff because it does not depend on the candidate's party label or the ideological location of the voter. Voters' nonideological preferences are assumed to be homogeneous. I am assuming the existence of common voter interests in order to investigate the conditions necessary for a campaign contribution limit to serve such interests.

Specifically, I assume that a candidate of type $(1, q_u)$ is preferred to one of type $(0, q_u)$ for $q_u \in \{0, 1\}$, and that a candidate of type $(q_a, 0)$ is preferred to one of type $(q_a, 1)$ for $q_a \in \{0, 1\}$. That is, $q_a = 1$ denotes the presence of a preferred advertisable characteristic (such as a verifiable qualification for office) and $q_u = 1$ represents the presence of a less preferred unadvertisable characteristic (such as being a 'special interest' type). Given these assumptions, I normalize payoffs as follows.

$$u(1,0) = 1$$
$$u(1,1) = 1 - z, z > 0$$
$$\sigma(0,0) \cdot u(0,0) + \sigma(0,1) \cdot u(0,1) = 0$$

Interpreting payoffs as monetary transfers, this says all voters will receive \$1 if the winner of the election has a favorable advertisable characteristic ($q_a = 1$). However, they must pay a cost equal to \$$z$ if she is a 'special interest' type ($q_u = 1$). An intuitive interpretation of this setup is that 'special interest' (1, 1) candidates plan to grant a subsidy that benefits a particular group at a cost of z to voters at large.

If candidate $j \in \{D, R\}$ wins the election, a voter with ideology i receives a payoff equal to

$$U(q_{ja}, q_{ju}, i_j, i) = u(q_{ja}, q_{ju}) - \phi \cdot |i - i_j|$$

2.1.3. Campaign messages

Following a common approach in the modeling of elections, I assume that there are two types of voters. A fraction $(1-\alpha)$ are independently "informed," a fraction α are initially "uninformed," where $\alpha \in (0, 1)$.[8] Informed voters learn about candidates from sources other than the campaigns themselves. Intuitively, these voters are assumed to be interested in politics and therefore read newspapers, etc. As a result, informed voters learn the candidates' advertisable and unadvertisable characteristics irrespective of their campaign spending.

In contrast, uninformed voters initially know only the candidates' party affiliations and are not assumed to actively search out additional information about them. Any such information must therefore be provided to them via campaign messages (e.g. advertisements). The intuitive idea is that there is a set of voters who are only marginally interested in the election, and who therefore receive only information that is bundled with other products such as TV or radio programming. These individuals may potentially be affected by campaign advertisements.

After the campaign, both informed and uninformed voters are assumed to vote sincerely for the candidate whom they prefer given their posterior beliefs.[9] Informed voters therefore always vote "correctly," i.e. for the candidate whom they truly prefer. In the absence of any additional information, an uninformed voter would cast his ballot according to his partisan preference alone. Depending on the candidates' nonideological characteristics, this may or may not be the one he truly prefers. Campaign communication may therefore affect (and possibly improve) the choices made by uninformed voters.

Specifically, candidates may be able to improve their chances of winning the election by sending a campaign message. Those who have a positive advertisable characteristic can send a campaign message, denoted $m = 1$, that credibly reveals this to uninformed voters. The cost of sending such a message is B.[10] Those who lack a positive

[8] More precisely, I am assuming that for all $i \in [\mu - \tau, \mu + \tau]$, there is a continuum of voters with identical preferences, a fraction $(1-\alpha)$ of whom are "informed" and a fraction α of whom are "uninformed."

[9] It has been argued that sincere voting may not be rational even in a two-candidate election when voters are imperfectly informed (see Feddersen and Pesendorfer, 1996). The corresponding strategic concerns do not play a role in this model because there is a continuum of voters so that no voter can be pivotal.

[10] Note that the advertising choice is discrete in this model. In this respect, my approach mirrors that of Ashworth, 2006. With certain technical caveats, the main arguments of the paper extend to a model in which campaign messages are transmitted to a fraction of the electorate that is continuously increasing in campaign spending (as in Coate, 2004a,b).

advertisable characteristic are unable to send such a message. When a candidate does not send a message, we will write $m=0$. Unadvertisable characteristics cannot be revealed through campaign messages. As in other signaling games, the 'effectiveness' of campaign messages is determined in equilibrium.

2.1.4. Donors

In order to send a message, a candidate must raise B dollars by soliciting contributions from donors. To keep things simple and focus on the basic premise of the equalization argument, I do not discuss the fund-raising process or the policy preferences of donors in detail. Instead I simply assume that a candidate of type $(1, q_u)$, is associated with a donor group characterized by a size $\gamma(q_u)$ and an 'intensity of support' $f(q_u)$. All members of this group are assumed to have identical preferences. Specifically, each member will receive a payoff equal to $f(q_u)$ if the candidate is elected, and 0 otherwise.[11]

Since individual contributions constitute a public good among the members of a donor group, an uncoordinated voluntary contributions mechanism would yield at most one positive contribution in this context. I therefore assume that the members of each group coordinate their decisions and share the cost of their aggregate contribution equally.[12]

2.1.5. Sequence of events

The sequence of events is as follows: (1) Nature draws one candidate for each party, (2) donors make campaign contributions, (3) candidates send messages, and (4) voters update their beliefs and vote.

2.2. Analysis

2.2.1. The effectiveness of campaign messages

The effectiveness of a campaign message depends on what types of candidates voters believe are sending such messages. Beliefs concerning the behavior of a type (q_a, q_u) candidate are denoted $\hat{\lambda}(q_a, q_u) \in \{0, 1\}$. If voters believe that a type (q_a, q_u) candidate sends a message, we write $\hat{\lambda}(q_a, q_u)=1$. Otherwise, $\hat{\lambda}(q_a, q_u)=0$. Since only candidates with a favorable advertisable characteristic can send messages, we must have $\hat{\lambda}(0, q_u)=0$. Thus, only $\hat{\lambda}(1, 0)$ and $\hat{\lambda}(1, 1)$ are determined in equilibrium. A vector of such beliefs is denoted $\hat{\boldsymbol{\lambda}}=(\hat{\lambda}(1, 0), \hat{\lambda}(1, 1)) \in \{0, 1\}^2$.

Given beliefs $\hat{\boldsymbol{\lambda}}$, an uninformed voter can determine his expected utility from electing a candidate conditional on whether or not she has sent a message during the campaign. A voter who sees a campaign advertisement learns that the candidate has a favorable advertisable characteristic, i.e. that $q_a=1$. This is the message's *explicit* information content. In addition, the voter can make inferences as to the probability that she has an unfavorable unadvertisable characteristic, i.e. $q_u=1$. These inferences constitute the message's *implicit* information content. If a candidate has sent no message during the campaign, the uninformed voter receives no explicit information and must make inferences about both advertisable and unadvertisable characteristics. In both cases, the inferences voters make depend on their beliefs $\hat{\boldsymbol{\lambda}}$.

I define a candidate's 'reputation,' denoted $\rho(q, m, \hat{\boldsymbol{\lambda}})$, as the average of voters' expected nonideological payoffs from electing her, given her true type q, the message she sends m, and voter beliefs $\hat{\boldsymbol{\lambda}}$. Recall that informed voters know the true type of each candidate irrespective of whether she sends a message. In contrast, uninformed voters form their expectations conditional on the message received. Thus,

$$\rho(q, m, \hat{\boldsymbol{\lambda}}) = (1-\alpha)\cdot u(q) + \alpha \cdot E[u(q)|m, \hat{\boldsymbol{\lambda}}]$$

That is, a candidate's reputation is a convex combination of her true value to voters, on the one hand, and her expected value as revealed by campaign communication, on the other. The proof of the following lemma is relegated to the Appendix.

Lemma 1. *Suppose candidates D and R are of type q_D and q_R, and that they send messages m_D and m_R, respectively. Then, given beliefs $\hat{\boldsymbol{\lambda}}$, the probability with which candidate D wins the election is equal to*

$$\pi_D = \frac{1}{2} + v \cdot \varkappa + \eta \cdot [\rho(q_D, m_D, \hat{\boldsymbol{\lambda}}) - \rho(q_R, m_R, \hat{\boldsymbol{\lambda}})]$$

where v and η are positive exogenous parameters.

[11] Note that this setup implicitly reflects the assumption that donor preferences differ from those of voters. In particular, we can imagine that a type (1, 1) candidate's support base consists of "special interest" donors, while a type (1, 0) candidate relies on "public interest" donors.

[12] The choice mechanism used is unimportant, since all members are identical. This assumption can also be interpreted as stating that donors follow a sort of Kantian imperative. (For a similar approach, see Roemer's (2005) notion of a "Kantian Equilibrium.")

That is, the probability with which candidate D wins depends on the strength of her party, $\varkappa$, and the difference between her and her opponent's reputations. If some voters are initially uninformed (i.e. $\alpha>0$), these reputations will depend on whether the candidates send messages. I define the 'effectiveness of advertising,' $\xi(\hat{\boldsymbol{\lambda}})$, to be equal to the difference between an uninformed voter's expected nonideological payoff from electing a candidate who has sent a message compared to one who has not. That is,

$$\xi(\hat{\boldsymbol{\lambda}}) = E[u(q)|m=1, \hat{\boldsymbol{\lambda}}] - E[u(q)|m=0, \hat{\boldsymbol{\lambda}}]$$

Given voter beliefs $\hat{\boldsymbol{\lambda}}$, sending a campaign message increases a candidate's chance of winning the election by $\alpha\cdot\eta\cdot\xi(\hat{\boldsymbol{\lambda}})$. Note that the effectiveness of advertising is independent of the candidate's unadvertisable characteristic.

2.2.2. Campaign contributions and communication

Since the total cost of sending a message is B, the members of a type $q_a=1$ candidate's donor group must decide whether or not to donate $\frac{B}{\gamma(q_u)}$ each in order to enable her to send a message revealing her advertisable characteristic. An individual donor's expected payoff from doing so is $\eta\cdot\alpha\cdot\xi\cdot(\hat{\boldsymbol{\lambda}})\cdot f(q_u)$. Thus, in the absence of contribution limits, a function mapping voter beliefs $\hat{\boldsymbol{\lambda}}$ into a communication pattern is given by

$$\lambda(1, q_u|\hat{\boldsymbol{\lambda}}) = \begin{cases} 1 \text{ if} \alpha\cdot\eta\cdot\xi(\hat{\boldsymbol{\lambda}})\cdot f(q_u) \geq \dfrac{B}{\gamma(q_u)}, \\ 0 \quad \text{otherwise.} \end{cases}$$

2.2.3. Contributions and communication under a contribution limit

Suppose that a contribution limit of l dollars is imposed. Then, a candidate can collect at most $\gamma(q_u)\cdot l$ dollars. Therefore she will be able to send a message only if $\alpha\cdot\eta\cdot\xi(\hat{\boldsymbol{\lambda}})\cdot f(q_u) \geq \frac{B}{\gamma(q_u)}$ (as above) and in addition $\gamma(q_u) \geq \frac{B}{l}$. Thus, under a contribution limit l, a function that maps beliefs $\hat{\boldsymbol{\lambda}}$ into a communication pattern is given by

$$\tilde{\lambda}(1, q_u|\hat{\boldsymbol{\lambda}}, l) = \begin{cases} \lambda(1, q_u|\hat{\boldsymbol{\lambda}}) \text{ if } \gamma(q_u) \geq \dfrac{B}{l}, \\ 0 \qquad \text{otherwise.} \end{cases}$$

In words, a contribution limit 'censors' messages sent by candidates with contribution bases smaller than $\frac{B}{l}$. In this way, the model captures the basic intuition that a contribution limit will tend to reduce receipts and communication by candidates who have few supporters.[13]

2.2.4. Laissez-faire and policy equilibria

A *laissez-faire equilibrium* is a vector of advertising levels $\boldsymbol{\lambda}^*=(\lambda^*(1,0),\lambda^*(1,1)) \in \{0,1\}^2$ such that they will actually be chosen if voter beliefs are given by $\boldsymbol{\lambda}^*$. I.e.

$$\lambda^*(1, q_u) = \lambda(1, q_u|\boldsymbol{\lambda}^*) \text{ for } q_u \in \{0, 1\}$$

An *equilibrium under a limit l* is a vector of advertising levels $\tilde{\boldsymbol{\lambda}}^* \in \{0,1\}^2$ such that

$$\tilde{\lambda}^*(1, q_u) = \tilde{\lambda}(1, q_u|\tilde{\boldsymbol{\lambda}}^*, l) \text{ for } q_u \in \{0, 1\}$$

2.2.5. Voter welfare

The question which we want to address is whether voters will benefit from the imposition of a campaign contribution limit. Therefore, we will use voters' (not candidates' or donors') expected utilities in laissez-faire and

[13] Since there are only two discrete communication levels in this model, a contribution limit perfectly blocks a candidate's message if her support base is too small. With certain technical caveats, the logic developed here extends to the case where the level of communication is continuously increasing in spending. In that case, a contribution limit leads to a reduction of communication levels for candidates with small support groups.

policy equilibria as our welfare measure. Suppose that the equilibrium advertising pattern is given by $\boldsymbol{\lambda}^* \in \{0, 1\}^2$. It can be a laissez-faire or policy equilibrium. Then, the following welfare measure constitutes a monotone transformation of *every* voter's expected utility in that equilibrium (see Appendix).

$$W(\boldsymbol{\lambda}^*) = \xi(\boldsymbol{\lambda}^*) \cdot \sum_{q_u \in \{0,1\}} \sigma(1, q_u) \cdot \lambda^*(1, q_u) \cdot [u(1, q_u) - \overline{u}],$$

where $\overline{u} = \sum_q \sigma(q) \cdot u(q)$ is the expected nonideological utility from electing a randomly drawn (i.e. average) candidate. We can see directly that campaign finance policy will enhance voter welfare if it increases the volume $\lambda(1, q_u)$ and effectiveness $\xi(\boldsymbol{\lambda}^*)$ of campaign messages sent by *above average* candidates, and if it limits or prevents advertising by *below average* candidates. Note that this measure is equal to zero when no advertising takes place. Thus, $W(\boldsymbol{\lambda}^*)$ measures welfare relative to a benchmark of prohibiting all contributions and spending.

2.3. The effect of a campaign contribution limit

The Appendix contains a formal discussion of the conditions under which a contribution limit will lead to an increase in voter welfare. Readers interested in the technical details are referred to that analysis. The main substantive conclusions are less formally summarized in the following proposition.

Proposition 1. *Suppose donors are sufficiently motivated.*[14] *Voters will benefit from the imposition of a contribution limit only if two conditions are satisfied:*

(1) Candidates with voter-preferred unadvertisable characteristics are supported by larger donor groups (and therefore collect smaller contributions) than those with less preferred unadvertisable characteristics.
(2) Information about unadvertisable characteristics is more valuable to voters than information about advertisable characteristics.

To understand the intuition underlying this result, note that there are four possible equilibrium advertising patterns $\boldsymbol{\lambda}^* = (\lambda^*(1, 0), \lambda^*(1, 1)) \in \{0, 1\}^2$. (Recall that $\lambda^*(1, q_u) = 1$ if candidates of type $(1, q_u)$ advertise, and $\lambda^*(1, q_u) = 0$ otherwise.) Borrowing terminology familiar from the signaling literature, we can group these into pooling and separating equilibria. These equilibria differ in the amount of information that is revealed to voters about candidates' advertisable and unadvertisable characteristics.

The pooling equilibria are $\boldsymbol{\lambda}^* = (0, 0)$ and $\boldsymbol{\lambda}^* = (1, 1)$. In the first case, no campaign messages are sent and voters learn nothing about candidate characteristics. That is, they are completely unable to distinguish between candidates of different types. As a consequence, they must base their decisions on party labels alone. In the second case, all candidates who exhibit positive advertisable characteristics send messages, irrespective of their unadvertisable characteristic. Voters can therefore perfectly distinguish candidates with positive advertisable characteristics from those who do not exhibit such characteristics. However, they are unable to distinguish between these candidates based on unadvertisable characteristics.

The separating equilibria are $\boldsymbol{\lambda}^* = (1, 0)$ and $\boldsymbol{\lambda}^* = (0, 1)$. In the first case, only candidates with positive advertisable and unadvertisable characteristics send messages. In the second, only those with positive advertisable and *negative* unadvertisable characteristics do so. In a separating equilibrium, voters can perfectly distinguish the advertising type, but all other types remain indistinguishable from one another.

The potential benefit of a contribution limit lies in the fact that it may cause a shift from a pooling equilibrium to a separating equilibrium.[15] In order to understand the intuition underlying Proposition 1, suppose that the laissez-faire equilibrium is the pooling equilibrium $\boldsymbol{\lambda}^* = (1, 1)$. (The other case is discussed in footnote 16.)

Since all candidates with positive advertisable characteristics send messages, voters cannot tell whether an advertising candidate is a 'public interest' or a 'special interest' type. This forces them to attach the same expected value

[14] Formally, $f(q_u) \to \infty$ for $q_u \in \{0, 1\}$. This assumption excludes the knife-edge case discussed in footnote 15. In that case, condition (2) in not necessary. In contrast, condition (1) is necessary under *all* circumstances.

[15] Under certain conditions, a contribution limit may also cause a beneficial shift from the separating equilibrium $\boldsymbol{\lambda}^* = (0, 1)$ to the other separating equilibrium $\tilde{\boldsymbol{\lambda}}^* = (1, 0)$. However, this only happens in a knife-edge case. (Intuitively, it requires that 'public interest' donors to be very sensitive to the effectiveness of advertising.)

to all advertising candidates. Therefore, voters will *overestimate* candidates with 'bad' unadvertisable characteristics and *underestimate* those with 'good' unadvertisable characteristics. Intuitively, 'special interest' candidates are 'fooling' voters into excessively supporting them. Conversely, advertising by 'public interest' candidates is relatively ineffective because voters are 'rationally cynical,' fearing that an advertising candidate may have 'something to hide.'

Now suppose that we have a way to prevent 'special interest' candidates from advertising. This would bring about the separating equilibrium $\tilde{\boldsymbol{\lambda}}^*=(1, 0)$, in which only 'public interest' candidates communicate. This change has three effects. First, among candidates with positive advertisable characteristics, public interest types become more likely to defeat special interest types (because the former still advertise and the latter no longer do). Second, the *effectiveness* of advertising may increase because voters are less cynical. Therefore, public interest types may also become more likely to defeat candidates who lack popular advertisable characteristics (since they do not advertise in either scenario). Both of these effects are unambiguously beneficial. On the other hand, candidates who exhibit popular advertisable but unpopular unadvertisable characteristics (i.e. 'special interest' types) become less likely to defeat opponents that lack positive advertisable characteristics. This effect will be beneficial only if the cost of the special interest transfer fully outweighs the value of the advertisable characteristic ($z>1$). Otherwise, it will imply a cost.

Thus, when $z>1$, the net benefit from the change is unambiguously positive and voters would benefit from preventing special interest candidates from advertising. For $z<1$, the net benefit depends on the distribution of types. The corresponding conditions are derived and graphically depicted in the appendix. Intuitively, they can be summarized by saying that the net benefit is positive if it is 'more important,' given the relative frequency of candidate types, for voters to distinguish between them based on advertisable or unadvertisable characteristics. This gives rise to condition (2).

Finally, suppose that condition (2) is satisfied so that there would indeed be a benefit from preventing special interest candidates from advertising. We then turn to the question whether a campaign contribution limit will serve this purpose. Clearly, this will be true only if special interest candidates are supported by fewer donors and therefore depend on larger contributions than 'truly popular' ones. This gives rise to condition (1).[16]

To summarize, the model demonstrates that a contribution limit can be beneficial if the status quo involves advertising by candidates who differ in *unadvertisable* characteristics. If these characteristics are sufficiently *important* relative to those that are advertised, uninformed voters cannot distinguish between candidates who are 'truly popular' and those who only appear to be, based on their advertisements. Assuming that candidates with less preferred unadvertisable characteristics rely on larger contributions, a contribution limit can prevent them from advertising. As a consequence, uninformed voters become better able to identify 'truly popular' candidates and improve their choices.

2.4. An empirical implication of the equalization argument

Proposition 1 identifies two conditions, both of which are necessary for the equalization argument to apply. As reflected by condition (1), the central assumption underlying the equalization argument is that 'better' candidates collect smaller contributions than others, Whether this is indeed the case is an interesting empirical question. However, it would be difficult to test this hypothesis directly, as this would require us to identify a reliable measure of candidate quality. None the less, the following proposition shows that an empirical test of the equalization argument is possible even without such a measure, as long as we are willing to assume the presence of at least some independently informed voters. Under this assumption, condition (1) has the following testable implication.

Proposition 2. *Suppose $\alpha<1$. (I.e. some voters are independently informed) Then, if conditions are such that voters prefer a campaign contribution limit be imposed, a candidate's expected vote share conditional on spending levels and party strengths is negatively (positively) related to the size of her (her opponent's) individual (i.e. per capita) contributions. That is, holding aggregate spending levels and party strengths constant, candidates who collect larger individual contributions (and those whose opponents collect smaller individual contributions) are expected to attain smaller vote shares than those who collect smaller individual contributions (whose opponents collect larger individual contributions).*

[16] Similar reasoning applies if the laissez-faire equilibrium is $\boldsymbol{\lambda}^*=(0, 0)$. This no-ad equilibrium can arise if voter cynicism causes advertising to become ineffective. In that case, blocking the special interest type is beneficial because it causes advertising to become effective and 'truly popular' candidates will send messages (see Appendix).

Note that Proposition 2 begins with the premise that voters prefer the imposition of a campaign contribution limit, and then identifies an empirical implication that follows from this. Thus, the identified relationship between vote shares and contribution sizes is an empirical implication of the equalization argument, not a prediction of the model per se. Intuitively, this relationship follows from two considerations.

First, a candidate's vote share depends on the opinions of two voter groups. While uninformed voters react to campaign messages, informed voters are independently informed of the candidates' true types. When the effects of campaign spending and advertising are controlled for, their impact on uninformed voters is essentially 'filtered out.' Thus, any remaining differences in electoral success reflect the opinions of informed voters. Controlling, in addition, for party strengths ensures that the finally remaining difference reflects candidate quality. For example, suppose that the expected location of the median voter is exactly $\frac{1}{2}$ and that the two candidates spend exactly the same amount of money (i.e. both send a message, or neither sends a message). Then, both will receive the same number of votes from uninformed voters. If one candidate receives more votes overall, the difference must reflect the opinions of *informed* voters. Thus, we can conclude that this must be the better candidate (i.e. the one who has better unadvertisable characteristics).

Second, recall that a necessary condition for a contribution limit to be beneficial is that candidates who have less preferred unadvertisable characteristics collect larger contributions (see Proposition 1). If this condition is satisfied, the logic just outlined implies that *holding party strengths and levels of spending constant*, candidates who collect larger contributions (or whose opponents collect smaller contributions) attain fewer votes in expectation.

It is important to emphasize that this result does *not* hinge on an assumption that voters make inferences from observing a candidate's reliance on large contributions. In fact, the equalization argument would clearly not apply if voters were able to take such information into account.[17] The model was therefore based on the assumption that voters do not observe such information.

3. Testing the equalization argument

Proposition 2 identifies an empirical implication of the equalization argument. In particular, the implication is that vote shares should be negatively related to the size of a candidate's own contributions and positively related to the size of her opponent's contributions *after party strengths and campaign spending have been controlled for*. Note that this is a purely *statistical* statement. As explained above, there is no claim being made that contribution sizes have a *causal* impact on a candidate's vote share. In the following section, I attempt to assess whether there is empirical evidence to support or reject this statistical implication. Once again, it should be emphasized that the objective of the following analysis is not to test the theoretical model per se. Instead, the goal is to test the equalization argument in support of contribution limits.

The question addressed is similar to one posed in a recent paper by Prat et al. (2006), who investigate whether fund-raising success is a signal of candidate quality. In that study, candidate quality is measured using the results of a survey asking political insiders to rate the 'effectiveness' of state legislators in North Carolina. The results show that a candidate's ability to collect *small* contributions is positively correlated with candidate quality. Note that this result precisely corresponds to one of the conditions necessary for the equalization argument to apply (see Proposition 1). It therefore appears to lend some support to the equalization argument. However, this conclusion requires us to accept the 'legislator effectiveness' survey as a measure of candidate quality.

The advantage of the empirical strategy employed below is that it does not require me to identify a directly observable measure of candidate quality. Instead of relying on such a measure, I am using a revealed preference argument. Specifically, I am using informed voters' choices as indicators of candidate quality. The basic logic can be explained using the following analogy. Suppose a car company produces two models that are sold for the same price. Further, suppose the company spends the same amount of money on advertisements for both models. Then, if more units of one model are sold, we can infer that this model is 'truly preferred' to the other. The important thing is that we can draw this conclusion without having to know what the difference between the two models actually is. In this way, using electoral returns *while controlling for campaign spending* provides us with a convenient way to measure candidate quality.

[17] If they did, there would be no need to correct for a bias in aggregate receipts. A problem arises only if voters cannot distinguish between advertisements paid for by large vs. those paid for by small contributions.

I am aware of only one other study examining the relationship between candidate fund-raising statistics and electoral success (Dharmapala and Palda, 2002). In that analysis, the authors speculate that the concentration of a candidate's contributions from Political Action Committees may be related to her public appeal, and suggest that this hypothesis can be tested by estimating the relationship between a 'campaign contribution concentration index' and electoral success. For challengers and open seat candidates, Dharmapala and Palda show that, controlling for a candidate's share of spending in the district, there is a negative relationship between concentration of contribution sources and electoral success. The authors suggest that their result is evidence that campaign contributions constitute speech and are therefore protected under the First Amendment. Their analysis differs from what follows in that it looks at contributions from Political Action Committees, while I focus on contributions from individuals.[18] Further, their empirical analysis treats a candidate as the unit of observation, while in my analysis the unit of observation will be an election.

3.1. Data and empirical specification

The data set I use comprises 1390 elections to the House of Representatives held between 1992 and 2000. All races are challenger-incumbent contests between a Republican and a Democratic candidate in which both candidates received positive aggregate contributions and attained at least ten percent of the vote. The dependent variable in all regressions is the challenger's percentage share of the vote. The independent variables include measures of the challenger's party strength, both candidates' aggregate levels of spending, as well as the fraction of each candidate's receipts due to individual contributions above a given threshold. Party strength is measured using a dummy indicating whether the challenger is a democrat as well as her party's district level vote share in the 1992 to 2000 presidential elections.[19]

The analysis presented above was based on the simplifying assumption that both candidates are drawn from the same prior distribution, and that the relationship between candidate types and advertising behavior was the same for both candidates. As is well known from previous research, however, there may be significant differences between challengers and incumbents that should be taken into account when we move to an empirical analysis. As is shown in the Appendix, the model can be extended to take account of such asymmetries, and the substantive conclusions derived remain essentially the same. However, such an analysis implies that the effectiveness of campaign spending and the relationship between contribution sizes and electoral success may differ between challengers and incumbents. Taking account of these differences, the challenger's vote share conditional on spending levels SPEND_C and SPEND_I, size of individual contributions CSIZE_C and CSIZE_I, and her party strength PST can then be written as

$$\mathrm{VOTE}_C = \rho_0 + \rho_1\mathrm{SPEND}_C + \rho_2\mathrm{SPEND}_I + \rho_3\mathrm{CSIZE}_C + \rho_4\mathrm{CSIZE}_I + \rho_5\mathrm{PST}_C + \upsilon,$$

where $E[\upsilon|\mathrm{SPEND}_C, \mathrm{SPEND}_I, \mathrm{CSIZE}_C, \mathrm{CSIZE}_I, \mathrm{PST}_C] = 0$.[20]

As stated in Proposition 2, the assumptions underlying the equalization argument correspond to the hypothesis that $\rho_3<0$ and $\rho_4>0$. I.e., holding constant levels of spending and party strengths, we should observe a negative relationship between the challenger's vote share and the size of her own contributions, and a positive relationship between her vote share and the size of the incumbent's contributions.

[18] There are a number of reasons to focus on data from individual contributions. Most importantly, FEC data on PAC contributions do not permit reliable inferences concerning the number of donors ultimately responsible for a given contribution. Dharmapala and Palda's concentration index need not be correlated with the number of individual donors responsible, and therefore does not measure the extent to which a limit (on PAC contributions) would affect a particular candidate.

[19] District level presidential vote shares are based on a data set made available by polidata.org. Information on spending and contributions is taken from FEC data sets. I thank Paul Clark at the FEC for his assistance in working with these data sets.

[20] On the surface, this equation resembles those used in studies aimed at estimating the effects of campaign spending. In that context, an issue of central importance is the endogeneity of campaign spending, i.e. the fact that campaign spending may be correlated with unobserved candidate quality (see, e.g., Jacobson, 1978, 1990; Green and Krasno, 1988, 1990; Levitt, 1994). It is important to note that this issue does not arise in the present context because the hypothesis we are testing concerns a *statistical* relationship between electoral success and the independent variables. According to the hypothesis we are testing, this statistical relationship exists precisely *because* spending and contribution sizes are correlated with unobserved candidate quality.

Two modifications are necessary in order to arrive at a specification we can estimate. The first concerns the variables CSIZE_C and CSIZE_I . While all contributions collected by a given candidate were of the same size in the theoretical model, this is obviously not the case in the data. Thus, we need to decide on another way to measure a candidate's reliance on large contributions. One solution would be to use the average size of her individual contributions. Due to data limitations, this measure is difficult to reliably construct. I therefore use a more easily constructed measure, denoted FRACLARGE, which reflects the fraction of a candidate's total receipts due to individual contributions that exceed a certain threshold (e.g. \$200).[21] In addition to its ease of construction, it appears that this measure more accurately reflects the extent to which a candidate would be affected by a contribution limit.

Finally, the challenger's district party strength, PST_C, is unobserved. It will be modeled using two variables. The first is the average district level vote share of the challenger's party in the 1992 to 2000 presidential elections, denoted PVOTE_C. Second, I include a dummy indicating whether the challenger is a democrat, denoted DEM_C. This controls for national partisan tides. Substituting, we then have the following specification:

$$\begin{aligned}\mathrm{VOTE}_C = {} & \beta_0 + \beta_1\mathrm{SPEND}_C + \beta_2\mathrm{SPEND}_I + \beta_3\mathrm{FRACLAGE}_C + \beta_4\mathrm{FRACLARGE}_I \\ & + \beta_5\mathrm{PVOTE}_C + \beta_6\mathrm{DEM}_C + \varepsilon\end{aligned}$$

It should be emphasized that an important difference between my approach and previous studies aimed at estimating the returns to campaign spending is that I purposefully do not include any observable measures of candidate quality in the regressions. In their place, I include a measure of each candidate's reliance on large contributions. If this measure is indeed related to characteristics that voters prefer (as required by the equalization argument), it should have a significant effect on expected vote shares after campaign spending and party strength are controlled for. A negative effect ($\beta_3 < 0$, $\beta_4 > 0$) would be consistent with the assumptions underlying the equalization argument. That is, it would suggest that a contribution limit will tend to reduce the receipts of unpopular candidates. An insignificant or positive effect ($\beta_3 \geq 0$, $\beta_4 \leq 0$), by contrast, would suggest that a contribution limit may lead to the unintended consequence of reducing the receipts of an essentially arbitrary set of candidates (if the effect is insignificant), or even of harming popular candidates (if it is positive).

3.2. Results

I estimate the model in three ways. First, I simply estimate the equation separately for each of the election years between 1992 and 2000 using OLS. Second, I pool the data and include year dummies as well as year-specific democrat effects. Finally, I make use of the panel structure and apply fixed effects. Intuitively, this controls for district-specific conditions that favor either challengers or incumbents. Based on an F test comparing the fixed effects and pooled estimations, we can reject the hypothesis that all fixed effects are zero. A Hausmann test reveals significant differences between the fixed and random effects estimators, suggesting that fixed effects is the appropriate specification.

Results are reported in Table 1. First, consider $\hat{\beta}_3$, the coefficient associated with the fraction of challenger receipts due to individual contributions above \$200. Recall that the hypothesis we are testing states that $\beta_3 < 0$. Instead, what we find is that the estimated coefficient is highly significant and positive in all estimations. Contrary to the equalization argument, this indicates that a challenger's vote share is positively related to her reliance on large contributions. For example, the estimated coefficient of 9.04 from the fixed effect regression indicates that an increase of one standard deviation in the challenger's reliance on large contributions (0.2) is associated with an increase of approximately 2% in her share of the vote.

Second, consider the estimated effect of the incumbent's reliance on large contributions. The hypothesis we are testing states that it is positive, i.e. $\beta_4 > 0$. Again, the evidence appears to point in the opposite direction. Overall, the effect is somewhat weaker and less significant than in the case of challengers. The estimate of −4.02 from the fixed effect regression indicates that an increase of one standard deviation in the incumbent's reliance on large contributions (.14) is associated with an increase of approximately 0.6% in her share of the vote.

[21] Results do not depend on the threshold value used to define large contributions. Specifically, similar results emerge when the threshold is set at \$200, \$500, or \$750. I therefore report results for a cutoff of \$200 only.

Table 1
Estimates of OLS and FE models, 1992–2000

	1992	1994	1996	1998	2000	Pooled OLS	FE
Challenger's spending (in $100 K)	1.65	1.36	1.21	0.56	0.70	0.87	0.64
	(0.22)**	(0.14)***	(0.12)***	(0.09)***	(0.09)***	(0.05)***	(0.05)***
Incumbent's spending (in $100 K)	0.32	0.33	0.06	0.24	0.03	0.18	0.15
	(0.13)**	(0.10)***	(0.09)	(0.07)***	(0.08)	(0.04)***	(0.05)***
Share of challenger's receipts due to individual contributions above $200	7.96	10.70	9.28	11.74	8.84	10.14	9.04
	(2.18)***	(1.74)***	(1.63)***	(1.72)***	(1.35)***	(0.78)***	(0.76)***
Share of incumbent's receipts due to individual contributions above $200	−7.43	−5.05	−1.69	−1.55	3.91	−1.61	−4.02
	(3.09)**	(2.12)**	(1.99)	(2.30)	(2.00)*	(1.04)	(1.57)**
Average district vote share of challenger's party in 1992–2000 presidential elections	0.33	0.39	0.49	0.47	0.49	0.44	0.25
	(0.04)***	(0.03)***	(0.03)***	(0.04)***	(0.03)***	(0.02)***	(0.03)***
Challenger is a Democrat	1.89	−6.39	2.23	1.12	0.38		
	(0.82)**	(0.71)***	(0.66)***	(0.71)	(0.57)		
Constant	16.85	16.86	9.31	9.55	7.80	12.76	21.41
	(1.74)***	(1.38)***	(1.36)***	(1.58)***	(1.41)***	(0.79)***	(1.45)***
Observations	306	327	344	287	315	1579	1579
Adjusted R-squared	0.47	0.71	0.72	0.63	0.70	0.64	0.69

*** significance at 1%; ** significance at 5%; * significance at 10%. The dependent variable is the challenger's percentage share of the vote. Columns labeled 1992–2000 are OLS regressions for each year. The 'Pooled OLS' estimates are obtained via OLS, including year dummies and their interaction with the democrat dummy (not reported in the table). 'FE' is a fixed effects regression using the same variables. Spending has been adjusted for inflation (1990 = 1.00).

To summarize, there is no empirical evidence in support of a key implication of the equalization argument in support of contribution limits. Specifically, it appears that, holding constant aggregate levels of spending, a candidate's vote share is not negatively but *positively* related to her own reliance on large individual contributions, and *negatively* related to her opponent's reliance on large individual contributions. Contrary to the assumptions maintained in Proposition 2, this suggests that candidates who rely more heavily on large individual contributions are actually more popular than those who collect small individual contributions. This appears to be especially true for challengers. The evidence therefore suggests that a campaign contribution limit may not enhance voter welfare and instead have the unintended effect of reducing the resources of popular candidates, especially among challengers. It therefore casts significant doubt on the equalization argument in support of contribution limits.

4. Conclusion

A principal argument in support of campaign contribution limits is that they equalize the influence of donors and thereby cause candidates' aggregate financial resources to more accurately reflect public support. The formal analysis in this paper demonstrates that this equalization argument is based on two assumptions. The first is that a candidate's reliance on large contributions is negatively correlated with things that voters like but which cannot be credibly revealed through advertisements. The second is that these unadvertisable candidate characteristics are more important to voters than characteristics which can be credibly revealed. If these conditions are satisfied, candidates who collects a given amount in large contributions will tend to be less 'truly popular' than those who collect the same aggregate amount in small contributions.

Under these conditions, a contribution limit can be beneficial from the point of view of voters. Intuitively, the reason is as follows. Suppose that the status quo situation is one in which candidates who engage in campaign advertising differ in terms of important but unadvertisable characteristics. Then, voters are unable to distinguish between 'truly popular' candidates and those who only appear to be, based on their advertisements. The latter type of candidate may therefore 'fool' them into supporting her. Knowing this, voters will be rationally cynical, and the effectiveness of campaign advertising will be compromised. If less popular candidates rely more heavily on large contributions, a contribution limit will tend to reduce their financial resources. This prevents such candidates from 'fooling' voters, restores their confidence in campaign advertising, and thereby increases its effectiveness for 'truly popular' types. The price for these benefits is that candidates with less popular unadvertisable characteristics are no longer able to reveal

their advertisable characteristics. Therefore, the net benefit of a campaign contribution limit also depends on the relative importance of advertisable and unadvertisable characteristics.

The analysis also demonstrates that the conditions necessary for the equalization argument to apply generate a testable implication about the relationship between electoral success and the composition of a candidate's campaign budget. Specifically, holding aggregate levels of spending constant, a candidate's vote share should be negatively related to her own reliance on large contributions and positively related to her opponent's reliance on large contributions.

The existence of such a relationship therefore constitutes an empirical implication of the equalization argument. I tested this implication using data on congressional elections held between 1992 and 2000. The results indicate precisely the opposite of the relationship implied by the equalization argument, suggesting that 'truly popular' candidates actually rely more heavily on large contributions. [22] This result casts doubt on the equalization argument in support of campaign contribution limits.

In order to interpret this empirical result, it is important to remember that the analysis was conducted for a period in which contribution limits were already in place. Therefore, strictly speaking, I have only shown that *additional* limits on individual contributions are undesirable. Since data on campaign contributions were not collected before 1971, an investigation of the prior 'laissez-faire' situation is not possible at the federal level. Coming back to the study of Prat et al. (2006), their different results may reflect the fact that the $4000 individual contribution limit in North Carolina is so much higher than the $1000 limit at the federal level. If their measure of candidate quality is accepted, a lower contribution limit might be desirable in North Carolina. This paper suggests a way to investigate this question that does not rely on a measure of candidate quality. It would be interesting to repeat the analysis for North Carolina and other states that have disclosure requirements but no (or larger) contribution limits.

Likewise, a number of extensions to the theoretical model suggest themselves. One would be to more explicitly model the interaction of candidates and donors, and thus endogenize the size of a candidate's support base. This might provide insight into the reasons why more popular candidates appear to rely on larger individual contributions. Another extension worth investigating would be to allow candidates to provide negative information about their opponents.

Appendix A

Proof of Lemma 1. Informed voters know the candidates' types, so an informed voter with ideology i will vote for candidate D if $u(q_D)-\phi\cdot i>u(q_R)-\phi\cdot(1-i)$. An uninformed voter with ideology i will vote for candidate D after seeing messages m_D and m_R if $E[u(q_D)|m_D, \hat{\boldsymbol{\lambda}}]-\phi\cdot i>E[u(q_R)|m_R, \hat{\boldsymbol{\lambda}}]-\phi\cdot(1-i)$. Given a realization of μ, the fraction of informed voters voting for candidate D is $\frac{1}{2}+\frac{1}{2\tau}\cdot\left(\frac{1}{2}-\mu\right)+\frac{1}{4\tau\phi}\cdot[u(q_D)-u(q_R)]$. The fraction of uninformed voters doing so is $\frac{1}{2}+\frac{1}{2\tau}\left(\frac{1}{2}-\mu\right)+\frac{1}{4\tau\phi}E[u(q_D)-u(q_R)|m_D, m_R, \hat{\lambda}]$. Then the total fraction of *all* voters voting for candidate D is $\frac{1}{2}+\frac{1}{2\tau}\cdot\left(\frac{1}{2}-\mu\right)+\frac{(1-\alpha)}{4\tau\phi}\cdot[u(q_D)-u(q_R)]+\frac{\alpha}{4\tau\phi}\cdot(E[u(q_D)|m_D, \hat{\lambda}]-E[u(q_R)|m_R, \hat{\lambda}])$. Thus, defining a candidate's reputation as $\rho(q,m,\hat{\boldsymbol{\lambda}})=(1-\alpha)\cdot u(q)+\alpha\cdot E[u(q)|m,\hat{\boldsymbol{\lambda}}]$, the probability with which candidate D wins the election is

$$\begin{aligned}\pi_D(q_D,q_R,m_D,m_R|\hat{\boldsymbol{\lambda}}) &= \Pr\left(\mu<\frac{1}{2}+\frac{1}{2\phi}\cdot\left[\rho\left(q_D,m_D,\hat{\boldsymbol{\lambda}}\right)-\rho\left(q_R,m_R,\hat{\boldsymbol{\lambda}}\right)\right]\right)\\ &= \frac{1}{2}+\frac{1}{2r}\cdot\varkappa+\frac{1}{4r\phi}\cdot\left[\rho\left(q_D,m_D,\hat{\boldsymbol{\lambda}}\right)-\rho\left(q_R,m_R,\hat{\boldsymbol{\lambda}}\right)\right].\end{aligned}$$

[22] It is beyond the scope of this essay to investigate the reasons why popular candidates might collect large contributions. Two explanations suggest themselves for further investigation. The first is that collecting significant amounts in small contributions may require candidates to cater to large organized groups. As Olson (1965) observed, such groups most often represent particularistic interests. A second explanation is that large donors may be better at predicting who will be popular. In either case, the imposition of a contribution limit is likely to harm popular candidates and thus adversely affect electoral outcomes.

Welfare measure. Given a pair of candidates of types q_D and q_R, candidate D wins the election if $\mu<\tilde{\mu}(q_D, q_R, \boldsymbol{\lambda}^*)$, where $\tilde{\mu}(q_D, q_R, \boldsymbol{\lambda}^*) = \frac{1}{2} + \frac{1}{2\phi}[\rho(q_D, \lambda^*(q_D), \boldsymbol{\lambda}^*) - \rho(q_R, \lambda^*(q_R), \boldsymbol{\lambda}^*)]$. Given this value $\tilde{\mu}$, the expected utility of the voter at location $\mu+h$[23] is

$$\int_{\left(\frac{1}{2}-\varkappa\right)-r}^{\tilde{\mu}(q_D,q_R,\boldsymbol{\lambda}^*)} [u(q_D) - \phi\cdot(\mu+h)]\mathrm{d}F(\mu) + \int_{\tilde{\mu}(q_D,q_R,\boldsymbol{\lambda}^*)}^{\left(\frac{1}{2}-\varkappa\right)+r} [u(q_R) - \phi\cdot(1-\mu-h)]\mathrm{d}F(\mu).$$

Denote this by $EU_h(q_D, q_R, \boldsymbol{\lambda}^*)$. This voter's *ex ante* expected utility is then $V(h, \boldsymbol{\lambda}^*) = \sum_{q_D}\sigma(q_D)\sum_{q_R}\sigma(q_R)\cdot EU_h(q_D, q_R, \boldsymbol{\lambda}^*)$. Notice that $V(h, \mathbf{0})$ is simply a constant. Subtracting it from $V(h, \boldsymbol{\lambda}^*)$ yields $V(h, \boldsymbol{\lambda}^*) - V(h, \mathbf{0}) = \frac{\alpha^2}{4r\phi}\cdot\xi(\boldsymbol{\lambda}^*)\cdot\sum_q \sigma(q)\cdot\lambda^*(q)\cdot[u(q)-\overline{u}]$, which is independent of h. Therefore, this constitutes a monotone transformation of *every* voter's expected utility. Finally, we can divide by the constant $\frac{\alpha^2}{4r\phi}$ to get the normalized welfare measure.

Effectiveness of advertising. Simple calculations show that the effectiveness of advertising is given by

$$\xi(\boldsymbol{\lambda}^*) = \frac{\sum_q \sigma(q)\cdot\lambda^*(q)\cdot[u(q)-\overline{u}]}{\left(\sum_q \sigma(q)\cdot\lambda^*(q)\right)\left(1-\sum_q \sigma(q)\cdot\lambda^*(q)\right)}$$

where $\overline{u}=\sum_q\sigma(q)\cdot u(q)$ is the expected nonideological utility from a randomly chosen candidate. Note that effectiveness is not well defined when $\boldsymbol{\lambda}^*=0$. In this case, beliefs can be freely chosen. Denote $\sigma_a=\sigma(1, 0)+\sigma(1, 1)$ and $\sigma_u = \frac{\sigma(1,1)}{\sigma_a}$. Assuming uniform trembles, a voter should believe that a candidate who advertises unexpectedly is a special interest type with probability σ_u and has an expected nonideological value of $1-\sigma_u\cdot z$. A candidate who does not advertise has an expected nonideological value of $\overline{u}$. Therefore $\xi(0, 0)=1-\sigma_u\cdot z-\overline{u}=(1-\sigma_a)\cdot(1-\sigma_u\cdot z)$.

Proof of Proposition 1. I will proceed by proving a series of claims. Continue denoting $\sigma_a=\sigma(1, 0)+\sigma(1, 1)$ and $\sigma_u = \frac{\sigma(1,1)}{\sigma_a}$. Also define $\Delta u(q)=u(q)-\overline{u}$. Then

Claim 1. *Suppose $z\geq\frac{1}{\sigma_u}$ $\left(\text{i.e. } \sigma_u\geq\frac{1}{z}\right)$, and let $f(q_u)\to\infty$ for $q_u=0, 1$ (i.e. suppose donors are sufficiently motivated).*[24] *Then, $\boldsymbol{\lambda}^*=(0, 0)$ and advertising is ineffective. Voter welfare increases with the imposition of a contribution limit if and only if $\gamma(0)>\gamma(1)$, i.e. if and only if public interest candidates are supported by larger donor groups (and therefore collect smaller individual contributions) than special interest candidates.*

Proof. Note that $\xi(1, 1)=1-\sigma_u\cdot z<0$. That is, messages would be ineffective if both candidates were advertising. This rules out the pooling equilibrium $\boldsymbol{\lambda}^*=(1, 1)$. Since $f(q_u)\to\infty$, we cannot have a separating equilibrium because both candidates will advertise when messages are effective. Therefore, the unique equilibrium is $\boldsymbol{\lambda}^*=(0, 0)$. Choosing beliefs as discussed above under "Effectiveness of advertising," $\xi(0, 0)=(1-\sigma_a)\cdot(1-\sigma_u\cdot z)<0$. Voter welfare is $W(0, 0)=0$. Now consider the effects of a contribution limit. If $\gamma(0)>\gamma(1)$, a limit just below $\frac{B}{\gamma(1)}$ will prevent special interest candidates from advertising. Then, since $\xi(1,0) = \frac{1-\sigma_a+\sigma_u\cdot\sigma_a\cdot z}{1-\sigma_a\cdot(1-\sigma_u)}>0$, $\tilde{\boldsymbol{\lambda}}^* = (1,0)$. That is, public interest candidates will advertise effectively in the policy equilibrium and welfare increases to $W(1, 0)>0$. If $\gamma(0)<\gamma(1)$, a limit will prevent either public interest candidates or both types of candidates from advertising. Since $\xi(0, 1)<\xi(1, 1)<0$, advertising will remain ineffective and the policy equilibrium will be $\tilde{\boldsymbol{\lambda}}^*=(0, 0)$, leaving welfare unchanged. Thus, when $z\geq\frac{1}{\sigma_u}$, voters benefit from the imposition of a contribution limit if and only if $\gamma(0)>\gamma(1)$. □

Claim 2. *Suppose $z\in\left(1,\frac{1}{\sigma_u}\right)$, and let $f(q_u)\to\infty$ for $q_u=0, 1$. Then, $\boldsymbol{\lambda}^*=(1, 1)$ and advertising is effective. Voter welfare increases with the imposition of a contribution limit if and only if $\gamma(0)>\gamma(1)$, i.e. if and only if public interest*

[23] Prior to the realization of the median voter's position μ, *every* voter's location in the [0, 1] ideological space is uncertain. We can therefore identify a specific voter only by referring to his distance h from the median voter, where $h\in[-\tau, +\tau]$.

[24] All claims assume that "donors are sufficiently motivated." If this assumption is not satisfied, the statements would become more complicated but the substantive content of the argument would not be affected.

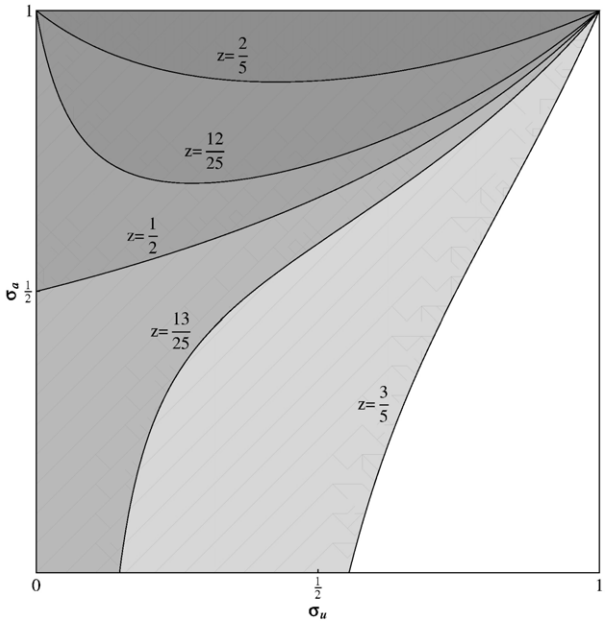

Fig. 1. Regions in $\sigma_a - \sigma_u$ space. The solid lines represent points at which W(1, 0) = W(1, 1). Moving from top to bottom, they are plotted for $z = \frac{2}{5}$ (top), $\frac{12}{25}$, $\frac{1}{2}$ (middle), $\frac{13}{25}$, and $\frac{3}{5}$ (bottom). For each value of z, the region in which W(1, 0) > W(1, 1) is the area above the corresponding solid line. For these parameter combinations, voters would prefer that a contribution limit be imposed.

candidates are supported by larger groups (and therefore collect smaller individual contributions) than special interest candidates.

Proof. Note that $\xi(1, 1) = 1 - \sigma_u \cdot z > 0$. Thus, for $f(q_u)$ large enough, $\boldsymbol{\lambda}^* = (1, 1)$. Also note that $\xi(1, 0) > \xi(1, 1)$ and $\Delta u(1, 1) < 0$. Therefore, $W(1, 0) - W(1, 1) = \sigma_a \cdot (1 - \sigma_u) \cdot (\xi(1, 0) - \xi(1, 1)) \cdot \Delta u(1, 0) - \sigma_a \cdot \sigma_u \cdot \xi(1, 1) \cdot \Delta u(1, 1) > 0$. Thus, as in the previous case, voters benefit from the imposition of a contribution limit if and only if $\gamma(0) > \gamma(1)$. □

Claim 3. *Suppose $z \in \left(\frac{1}{2}, 1\right)$, and let $f(q_u) \to \infty$ for $q_u = 0, 1$. Then, $\boldsymbol{\lambda}^* = (1, 1)$ and advertising is effective. Voter welfare increases with the imposition of a contribution limit if and only if $\gamma(0) > \gamma(1)$, and $\sigma_u < \overline{\sigma}_u(z, \sigma_a)$, where $\overline{\sigma}_u(z, \sigma_a)$ is increasing in z and σ_a.*

Proof. See next claim. □

Claim 4. *Suppose $z \in \left(0, \frac{1}{2}\right)$, and let $f(q_u) \to \infty$ for $q_u = 0, 1$. Then, $\boldsymbol{\lambda}^* = (1, 1)$ and advertising is effective. Voter welfare increases with the imposition of a contribution limit if and only if $\gamma(0) > \gamma(1)$, $\sigma_a > \overline{\sigma}_a(z)$, and $\sigma_u \in (\underline{\sigma}_u(z, \sigma_a), \overline{\sigma}_u(z, \sigma_a))$, where $\underline{\sigma}_u(z, \sigma_a)$ is decreasing in z and σ_a, and $\overline{\sigma}_u(z, \sigma_a)$ is increasing in z and σ_a.*

Proof. I will prove both of the previous claims simultaneously. Suppose $z \in (0, 1)$. Then $\xi(1, 1) = (1 - \sigma_u \cdot z) > 0$. Thus, for $f(q_u)$ large enough, $\boldsymbol{\lambda}^* = (1, 1)$. Voter welfare is $W(1, 1) > 0$.

Suppose $\gamma(0) < \gamma(1)$. Then the imposition of a contribution limit results in either $\tilde{\boldsymbol{\lambda}}^* = (0, 0)$ or $\tilde{\boldsymbol{\lambda}}^* = (0, 1)$. The former will occur if $\xi(0, 1) < 0$, i.e. if $z > \frac{1-\sigma_a}{1-\sigma_u \cdot \sigma_a}$. Then welfare drops from $W(1, 1) > 0$ to $W(0, 0) = 0$. $\tilde{\boldsymbol{\lambda}}^* = (0, 1)$ will occur if $z < \frac{1-\sigma_u}{1-\sigma_u \cdot \sigma_a}$. This implies $\Delta u(1, 1) = 1 - \sigma_a - (1 - \sigma_a \sigma_u) \cdot z > 0$. Also note that $\xi(1, 1) - \xi(0, 1) = (1 - \sigma_u)z + \frac{\sigma_a \cdot (1-\sigma_u)}{1-\sigma_a \sigma_u} > 0$. Therefore, $W(0, 1) - W(1, 1) = \sigma_a \cdot \sigma_u \cdot (\xi(0, 1) - \xi(1, 1)) \cdot \Delta_u(1, 1) - \sigma_a \cdot (1 - \sigma_u) \cdot \xi(1, 1) \cdot \Delta_u(1, 0) < 0$. So, for $\gamma(0) < \gamma(1)$, voters cannot benefit from a contribution limit. Now suppose $\gamma(0) > \gamma(1)$. In this case, the imposition of a limit results in $\tilde{\boldsymbol{\lambda}}^* = (1, 0)$. The resulting change in welfare is equal to $W(1, 0) - W(1, 1) = \frac{\sigma_a(1-\sigma_u)}{1-\sigma_a(1-\sigma_u)} \cdot [1 - \sigma_a(1 - \sigma_u z)]^2 - \sigma_a(1 - \sigma_a)(1 - \sigma_u z)^2$. This expression is positive if and only if the following condition holds:

$$\sigma_a > \frac{1 - z \cdot (2 - \sigma_u \cdot z)}{1 - z \cdot (2 - \sigma_u(2 - \sigma_u) \cdot z)}$$

Due to its nonlinear form, this condition is somewhat difficult to discuss analytically. I therefore use a graphical representation to aid the interpretation. Specifically, consider Fig. 1. The figure is displayed in $\sigma_a - \sigma_u$ space. The solid lines represent points at which $W(1, 0) = W(1, 1)$. Beginning at the top, they are plotted for $z = \frac{2}{5}$ (top), $\frac{12}{25}$, $\frac{1}{2}$ (middle), $\frac{13}{25}$, and $\frac{3}{5}$ (bottom). For each value of z, the region in which $W(1, 0) > W(1, 1)$ is the area *above* the corresponding solid line. For $z \in (0, \frac{1}{2})$, welfare increases with the imposition of a contribution limit if and only if σ_a is large and σ_u takes on *intermediate* values, i.e. if and only if $\sigma_u \in (\underline{\sigma}_u(z, \sigma_a), \overline{\sigma}_u(z, \sigma_a))$, where $\underline{\sigma}_u(z, \sigma_a)$ is decreasing in z and σ_a, and $\overline{\sigma}_u(z, \sigma_a)$ is increasing in z and σ_a. For $z \in (\frac{1}{2}, 1)$, welfare increases with the imposition of a limit if and only if σ_a is large and σ_u is small, i.e. if and only if $\sigma_u < \overline{\sigma}_u(z, \sigma_a)$, where $\overline{\sigma}_u(z, \sigma_a)$ is increasing in z and σ_a.

Intuitively, the graph shows that the net benefit of a contribution limit depends on how *important* it is to learn about the unadvertisable characteristic relative to the advertisable characteristic. Specifically, it will be important if z is large. Thus, as z increases, the line shifts down and the area in which a contribution limit increases welfare encompasses more and more of the space. When $z \geq 1$, Claims 1 and 2 apply and a limit is beneficial for *all* points in the space. For very small values of z ($< \frac{1}{2}$), the unadvertisable characteristic is important only if σ_a is large (meaning that the positive advertisable characteristic is *common* and thus not interesting) and σ_u takes on intermediate values (meaning that there is enough variance in the unadvertisable characteristic to make it interesting to learn about it). □

Proof of Proposition 2. Given an equilibrium advertising effectiveness ξ^*, candidate types q_D and q_R, and corresponding communication levels $\lambda_D = \lambda^*(q_D)$ and $\lambda_R = \lambda^*(q_R)$, candidate D's expected vote share is $E[y_D | q_D, q_R, \lambda_D, \lambda_R] = \frac{1}{2} + v\varkappa + \alpha\eta \cdot \xi^* \cdot [\lambda_D - \lambda_R] + (1 - \alpha)\eta \cdot [u(q_D) - u(q_R)]$. Denote the size of a candidate's individual contributions by w_j, and suppose that we observe only λ_j and w_j.

Then, candidate D's expected vote share is given by $E[y_D | w_D, w_R, \lambda_D, \lambda_R] = \frac{1}{2} + v\varkappa + \alpha\eta \cdot \xi^* \cdot [\lambda_D - \lambda_R] + (1 - \alpha)\eta \cdot (E[u(q) | \lambda_D, w_D] - E[u(q) | \lambda_R, w_R])$. Now suppose that $\gamma(0) > \gamma(1)$, as is required for the equalization argument to apply. In that case, $E[u(q) | \lambda, w]$ is decreasing in w, and hence $E[y_C | w_D, w_R, \lambda_D, \lambda_R]$ is decreasing in w_D and increasing in w_R. Finally, note that there is a one to one relationship between communication levels λ_j and spending $s_j = \lambda_j \cdot B$. Hence, we can substitute spending for λ_j. □

Extension: Asymmetric case. This section briefly discusses an extension of the model based on the assumption that the prior distribution of types, the fraction of voters independently informed about the true type, and the size and intensity of donor support may differ between the two candidates (e.g. between challengers and incumbents). The analysis of the symmetric case can be transferred virtually unchanged.

Specifically, denote the prior probability that candidate $j \in \{C, I\}$ is of type $q = (q_a, q_u)$ by $\sigma_j(q)$, and renormalize nonideological payoffs as follows. Let $u(1, 0) = 1$, $u(1, 1) = 1 - z$, and $\sigma_j(0, 0) \cdot u(0, 0) + \sigma_j(0, 1) \cdot u(0, 1) = u_j^0$. Assume j, when of type $(1, q_u)$, is associated with a donor group of size $\gamma_j(q_u)$ and intensity of support $f_j(q_u)$. Denote beliefs about candidate advertising patterns by $\hat{\boldsymbol{\lambda}}_{\boldsymbol{j}}$ and define them analogously to the symmetric case. Assume that a fraction $(1 - \alpha_j)$ of voters are independently informed of candidate j's type. Define $\rho_j(q, m, \hat{\boldsymbol{\lambda}}_{\boldsymbol{j}}) = (1 - \alpha_j) \cdot u(q) + \alpha_j \cdot E_j[u(q) | m, \hat{\boldsymbol{\lambda}}_{\boldsymbol{j}}]$, where E_j is an expectation given candidate j's prior type distribution. Given candidate types and messages, the challenger then wins with probability $\pi_C = \frac{1}{2} + v \cdot \varkappa + \eta \cdot [\rho_C(q_C, m_C, \hat{\boldsymbol{\lambda}}_{\boldsymbol{C}}) - \rho_I(q_I, m_I \hat{\boldsymbol{\lambda}}_{\boldsymbol{I}})]$. Candidate j's effectiveness of advertising is $\xi_j(\hat{\boldsymbol{\lambda}}_{\boldsymbol{j}}) = E_j[u(q) | m = 1, \hat{\boldsymbol{\lambda}}_{\boldsymbol{j}}] - E_j[u(q) | m = 0, \hat{\boldsymbol{\lambda}}]$. It is now easy to see that an equilibrium of the extended model is an advertising pattern $\boldsymbol{\lambda}^* = (\boldsymbol{\lambda}_{\boldsymbol{C}}^*, \boldsymbol{\lambda}_{\boldsymbol{I}}^*) \in \{0, 1\}^4$ such that for each j, $\boldsymbol{\lambda}_{\boldsymbol{j}}^*$ is an equilibrium of the symmetric model with $\sigma(q) = \sigma_j(q)$, $\alpha = \alpha_j$, $f(q_u) = f_j(q_u)$, and $\gamma(q_u) = \gamma_j(q_u)$. Further, it can then be shown that a monotone transformation of every voter's expected utility in equilibrium is given by $W(\boldsymbol{\lambda}^*) = \sum_j W_j(\boldsymbol{\lambda}_{\boldsymbol{j}}^*)$, where $W_j(\boldsymbol{\lambda}_{\boldsymbol{j}}^*) = \alpha_j^2 \cdot \xi_j(\boldsymbol{\lambda}_{\boldsymbol{j}}^*) \cdot \sum_{q_u} \sigma_j(1, q_u) \cdot \lambda_j^*(1, q_u)[u(1, q_u) - \overline{u}_j]$.

Thus, the conclusions derived from the symmetric case can be transferred to the asymmetric case almost without modification. To see this, suppose first that the policy maker can impose a different campaign contribution limit on challengers and incumbents. In that case, the conditions under which voters benefit from a given limit are exactly as in the symmetric case. An additional complication arises if the policy maker can set only a single contribution limit for both candidates. (Imagine a case where the equalization argument holds for challengers but not incumbents.) However, it should be clear that the substantive conclusions expressed in Proposition 1, as well as the empirical implication identified in Proposition 2, remain. Specifically, voters will benefit from a contribution limit only if unadvertisable candidate quality is inversely related to contribution sizes for *at least one* of the candidates (i.e. the challenger or the incumbent). Further, this implies that a candidate's vote share should be inversely related to the size of her contributions after spending and party strength have been controlled for.

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