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Objective. This article seeks to explain the puzzle of why incumbents spend so much on campaigns despite most research finding that their spending has almost no effect on voters. *Methods.* The article uses ordinary least squares, instrumental variables, and fixed-effects regression to estimate the impact of incumbent spending on election outcomes. The estimation includes an interaction term between incumbent and challenger spending to allow the effect of incumbent spending to depend on the level of challenger spending. *Results.* The estimation provides strong evidence that spending by the incumbent has a larger positive impact on votes received the more money the challenger spends. *Conclusion.* Campaign spending by incumbents is most valuable in the races where the incumbent faces a serious challenge. Raising large sums of money to be used in close races is thus a rational choice by incumbents.

Why do incumbents spend money to win reelection to office? They must expect that it helps them, but academics have found it incredibly difficult to discern any significant positive impacts of spending by incumbents on their reelection chances. Most early papers, such as Jacobson (1978), found that challenger spending had sizable impacts on House of Representatives election outcomes but that spending by incumbents was relatively unproductive. Levitt (1995:188) refers to this conclusion as the "long-held conventional wisdom among political scientists." Abramowitz (1988) found similar results for the Senate, where spending by challengers had three times as large an impact on the election outcome as spending by incumbents. Thus, the conventional wisdom after scores of articles investigating the topic is that spending by challengers greatly increases the challenger share of the vote but that spending by incumbents has little or no effect. Under certain circumstances, Coates (1998) even suggests that additional spending by incumbents can hurt their chances of winning. Since raising money is a "disgusting, degrading, demeaning experience" according to Hubert Humphrey, it seems unlikely that incumbents would go to the effort of soliciting funds unless they believed the money would help them win reelection.

One possibility is that incumbent politicians overestimate the importance of money in election campaigns and that candidates raise and spend money merely because that is what is typically done in American elections. Alternatively, it may be that campaign spending is valuable, even for incumbents, but that researchers have been unable to find significant positive impacts of incumbent spending because of data problems. The latter is a serious possibility as there are a number of difficulties in estimating the effects of campaign spending on election outcomes. The most important problem is that incumbents are likely to spend more money if they are facing a difficult challenge, and thus a drop in their expected share of the vote leads to an increase in their campaign spending. This means that the election outcome and campaign spending are simultaneously determined, and the impact of the election returns on spending will lead to a negative correlation between an incumbent's vote share and his or her campaign disbursements. For challengers, the endogeneity issue works the other way. As their election prospects improve, they find it easier to raise money and thus spending by challengers may appear to be more effective than it really is. A number of studies have used simultaneous equations models to address the fact that both the election outcome and spending are endogenous variables. Some of them, such as Jacobson (1978, 1990), uphold the traditional result that incumbent spending has negligible impacts on election outcomes, although others, such as Green and Krasno (1988) and Gerber (1998), find that greater spending significantly improves the incumbent's share of the vote. Erikson and Palfrey (2000) show that the endogeneity bias will be least severe among elections that are expected to be close. They find that among this subset of elections, ordinary least squares (OLS) regressions reveal a significant positive effect of incumbent spending on their vote shares.

In addition to endogeneity problems, there are two measurement issues that plague this literature. The first is that media advertising does not cost the same in each district, so a given amount of spending buys more advertisements in some districts than in others. Stratmann (2009) shows that when the cost of advertising in a district is controlled for, greater incumbent ad purchases do significantly raise the incumbent's vote share. A second measurement issue is that the quality of the politicians involved in an election is difficult to quantify. This creates an omitted variable problem because characteristics such as charisma that make a candidate attractive to voters may also help her to raise money. Thus, a candidate's quality is positively associated with both money and vote share, and an inability to control for quality means that the effects of money on election outcomes will be biased. Levitt (1994) controls for unobserved candidate quality by estimating the effects of spending on election outcomes among candidates who faced each other in more than one election. Assuming that candidate quality is constant over time, including fixed-effects controls for candidate quality in the estimates of the impact of spending on election outcomes. Levitt finds that both incumbent and challenger campaign spending has extremely small impacts on vote patterns. This result does not

solve the puzzle about why incumbents would bother to raise and spend money; instead, it extends the mystery to include why challengers would take the trouble to raise money.

If incumbent spending has a smaller impact on election outcomes than challenger spending, then incumbent politicians may have a self-serving motivation to enact limits on campaign spending. Evans (2007) finds evidence in Canadian elections that the majority party spending has initially positive impacts on votes received but that the returns to spending diminish more sharply than the returns to spending by the opposition party. Thus, there is a level of campaign spending limits that maximizes the majority party's share of the vote. Stratmann (2006) also finds that incumbent money affects outcomes in state elections in states that limit campaign spending.

This article presents an explanation for the incumbent spending puzzle by showing that incumbent spending has a significant influence on the election only when challengers spend a large enough amount of money. A theoretical explanation for this result is that perceptions of the incumbent are relatively fixed in voters' minds prior to the election campaign and thus advertisements that focus on the incumbent are less effective than those about the challenger. Incumbents do not stoop to the negative (but effective) advertisements, however, unless the challenger spends enough money to become a viable threat. If the impact of incumbent spending on the election outcome depends on the level of challenger spending, then models that estimate the determinants of election outcomes need to include an interaction term between the two spending variables. Thomas (1989, 1990) and Coates (1999) have allowed the effect of incumbent spending on elections to depend on the level of challenger spending, but this article is the first to do so while treating challenger and incumbent spending as endogenous.

Theoretical Discussion

Since Downs (1957) provided a detailed analysis of uncertainty in voter choices, it is well known that campaign advertisements have no impact on elections if voters have perfect information. In such a world, voters know every detail of the candidates' policy plans and can determine which candidate they prefer. When there is uncertainty, however, political advertisements can provide selective information to voters or persuade them to support one candidate over the others. The greater the uncertainty about a candidate, the more likely that new information from an advertisement is to change the voter's opinion, and there is considerable evidence that voters are more familiar with incumbents than with challengers. Jacobson (1978), for example, shows that 57 percent of voters in 1974 knew the name of their incumbent representative but only 31 percent could name the challenger running against him. Thus, voter opinions about the less well-known challenger are more open to persuasion than are opinions about the incumbent. This argument

is consistent with Sciarini and Kriesi (2003), who find that people whose opinions have crystallized are more resistant to changing their beliefs. If voters' views about the incumbent have crystallized, their opinions may be relatively immobile, in which case advertisements that focus on the incumbent have little impact on the election results while those about the challenger are more effective. Such a conclusion is supported by evidence from Erikson and Palfrey (1998), who find that the effect of incumbent spending on election outcomes is sizable for incumbents in their first reelection campaign but considerably smaller for more veteran incumbents. They also show that the effect of incumbent spending on election outcomes declines fairly steadily over successive reelection campaigns.

For the incumbent, then, advertisements that affect the current election are most likely to be focused on the challenger. Incumbents who are not facing a serious challenge do not need to worry about losing the current election, and they will try to build up their brand-name capital, which Lott (1991) argues is an important source of future electoral success. Erikson and Palfrey (1998) find evidence that higher current levels of spending by incumbents do contribute to their success in future elections. Incumbents who are in a close race, however, have a more immediate focus on the current election, and thus their advertisements should become more focused on their opponent. They cannot afford to spend money with longer-term considerations in mind if they are facing a serious challenge in the current election year.

When the incumbent faces a well-funded challenger, then, the incumbent spending will be focused on defining the challenger in the eyes of voters and it will have a significant impact on the election outcome. When there is little chance of being defeated in the election, the incumbent will spend money in ways that provide long-run benefits but that have little effect on the current election outcome. This theory is consistent with Kahn and Kenney (2000), who find that the percentage of total advertisements that is negative rises as senatorial races become more competitive. Grier (1989) also makes a similar argument that "perhaps incumbents are unwilling to stoop to effective, but negative, advertisements until they are in a serious contest (i.e. the challenger has spent a significant amount of money)." The implication is that incumbent spending will have a much larger impact on election outcomes when the challenger spends a considerable amount of money than when challengers have little or no campaign expenditures.

This prediction is one that also emerges from the model in Thomas (1989, 1990). He assumes that only challengers run negative advertisements and that incumbent advertisements are rebuttals. As challengers run more advertisements, the value to the incumbent of being able to spend money on rebuttals increases. Thus, campaign spending by incumbents becomes more effective as challenger spending rises. Both papers by Thomas find empirical support from OLS regressions, but they make no attempt to deal with the endogeneity problem that higher expected vote shares will influence how much money the challenger is able to raise and how much the incumbent will raise and spend.

Empirical Model and Data

The empirical model in this paper is shown in Equation (1):

$$vote_{it} = \beta_0 + \beta_1 S_{chall,it} + \beta_2 S_{inc,it} + \beta_3(S_{inc,it} \times S_{chall,it}) + \beta_4 X_{it} + \varepsilon_{it},$$
(1)

where $vote_{it}$ is the incumbent's share of the two-party vote in district i in election t, $S_{chall,it}$ and $S_{inc,it}$ are spending by the challenger and the incumbent, and X_{it} is a vector of control variables. The key advance this article makes over the previous literature is the introduction of the interaction term, which allows the impact of incumbent spending to depend on spending by the challenger, while treating both types of spending as endogenous. If spending helps a candidate but the impact of a dollar of campaign money does not depend on the opponent's level of spending, then $\beta_1 < 0$, $\beta_2 > 0$, and $\beta_3 = 0$. If incumbent spending is more effective the more the challenger spends, as this article argues, then $\beta_1 < 0$, $\beta_2 > 0$, and $\beta_3 = 0$.

The data set used to estimate the model consists of general elections between a Democratic and a Republican candidate running for the House of Representatives between 1972 and 2006. Only races pitting an incumbent and challenger are included. Data on election outcomes, spending, and the cash on hand at the beginning of the campaign come from the Federal Election Commission, <http://www.fec.gov>. House incumbents had a tremendous advantage over challengers during this time period and received 66 percent of the two-party vote on average. Challengers also spent slightly over $200,000 in real (2000) dollars while incumbents spent about $535,000 on average.

It is very difficult to measure the quality of challenger, but the control variables in Equation (1) include many of the variables that are commonly thought to indicate a competitive challenger, such as having held elected office, having been a previous major-party nominee for the House of Representatives or serving in the House, and being a state legislator at the time of the election. Almost 20 percent of the challengers between 1972 and 2006 had been their party's nominee in a previous general election campaign for the House of Representatives, 7.4 percent were state legislators, over 20 percent had held elective office, and 1.4 percent had previously served in the U.S. House of Representatives. The data on challengers were provided by Gary Jacobson.

Measures of incumbent characteristics that affect election outcomes include terms in office and whether they were in a leadership position or the chair or ranking member of a standing House committee. About 1.5 percent of the incumbents were in a leadership position (defined as being the Speaker of the House, a majority or minority leader, a majority or minority whip, or a caucus chair) while 8 percent were the chair or ranking member of one of the standing House committees. The typical incumbent was 52 years old and had served over 10 years in the House of Representatives. These data on incumbents were taken from <http://www.house.gov> and the *Biographical Directory of the U.S. Congress*. Equation (1) also includes the cash on hand left

over from previous elections that an incumbent had at the start of a reelection campaign. The average incumbent began a campaign with almost $140,000 available while challengers started a normal campaign with almost no cash on hand. As Epstein and Zemsky (1995) argue, a large war chest may scare away potentially high-quality challengers. All spending figures in the data set are measured in hundreds of thousands of real (2000) dollars.

To control for time-specific factors, Equation (1) includes dummy variables for each election year and election year dummies interacted with a variable that equals one if the incumbent was a Democrat. Those variables capture partisan swings in the overall electorate. To measure the partisan makeup of the district, Equation (1) includes a variable measuring the district vote share of the presidential candidate from the incumbent's party minus the district vote share of the presidential candidate from the challenger's party. Positive numbers mean that the district leans more heavily toward the incumbent representative's political party.

OLS estimates of Equation (1) are likely to be biased because the campaign spending variables are endogenous. This article presents two-stage least squares (2SLS) estimates of Equation (1) in order to deal with this endogeneity issue. The instruments included in the campaign spending equations but excluded from the voting equation are the incumbent's age and the challenger's cash on hand at the start of the election. Snyder (1992) provides a justification for using age as an instrument for spending. He shows that "investment PACs" such as corporate and labor groups give more money to younger representatives because these representatives have a longer expected political career ahead of them and have a greater likelihood of eventually moving up to the Senate. There is no reason to expect that age should affect the incumbent's electoral success once political experience is controlled for in the regressions. The challenger's cash on hand at the start of the campaign provides an indication of the extent of his or her fundraising network. Thus, it is correlated with total spending but should not affect the votes received once the overall level of spending and indicators of challenger quality are controlled for. Neither incumbent age nor challenger cash on hand at the start of the election has a significant impact on the vote outcome if it is included in the voting regression. As Bartels (1991) discusses, instruments are almost never perfect in being uncorrelated with the error term in the equation of interest, and OLS estimation may have smaller mean-squared errors than estimates using "quasi-instrumental" variables. Thus, this article presents OLS and two-stage least squares estimates of Equation (1) as well as a fixed-effects regression suggested by Levitt (1994).

If unobserved characteristics of candidates are correlated with both their vote-winning and fundraising abilities, then the spending variables will be correlated with the error term in the election outcome equation. Thus, the spending variables suffer from omitted variable bias because candidate quality is not controlled for. Candidate quality can reasonably be assumed to be relatively constant over time, however, so Levitt (1994) suggests that fixed

effects can be used to control for candidate quality, as in Equation (2):

$$vote_{jt} = \beta_j + \beta_1 S_{chall,jt} + \beta_2 S_{inc,jt} + \beta_3 (S_{inc,jt} \times S_{chall,jt}) + \beta_4 X_{jt} + \varepsilon_{jt},$$
(2)

where β_j is a fixed effect for each pair of candidates j. With the fixed effects in the regression, the coefficients estimate how a change in campaign spending affects the change in vote shares when two candidates meet in a repeated election. There were 1,373 such repeated elections between 646 different pairs of candidates from 1972 to 2006 so that the average pair in the data set faced off in 2.13 elections. Levitt (1994) uses fixed effects to control for both unobserved candidate pair and district characteristics, and hence he excludes districts that were redrawn in between the two elections in which the pair of candidates faced off. This article uses the district vote in presidential elections as a measure of the partisan makeup of the district. Thus, the sample used includes observations in which an election between the same two candidates was divided by redistricting. The fixed effects are interpreted as capturing the relative political talent of the two candidates running for office.

Results

Table 1 presents the first-stage regressions showing the determinants of spending by challengers and by incumbents between 1980 and 2006. Elections during the 1970s are excluded from these regressions because one of the key explanatory variables, the campaign cash that challengers have available at the beginning of the election, is unavailable for those years.

The results appear quite sensible. Challengers who have held office, who were state legislators, or who were former U.S. representatives spend more money than other challengers. Challengers spend less money on average when they are in districts that vote heavily for the incumbent party in presidential races, and when they are facing incumbents who have been in office for many terms and have large reserves of cash on hand at the start of the campaign. The latter result is consistent with the idea that high-quality challengers who are capable of raising considerable sums of money are deterred from entering races in which the incumbent has a large war chest available to spend. Challengers also spend more money when they are facing incumbents in leadership positions, perhaps because donors are more generous in giving to candidates who are attempting to unseat well-known leaders of the other party. Finally, challengers who have cash at the beginning of the campaign end up spending considerably more in their attempts to unseat the incumbent. The estimates actually suggest that a dollar on hand at the start of the campaign is associated with over $12 in extra spending during the election.

Incumbents clearly spend more money when they are facing serious challenges: when they are in districts whose voting in presidential elections favors the challenger's party, when the challenger has held office, been a state

TABLE 1

First-Stage Regressions Determining Challenger and Incumbent Spending

Variables	Challenger Spending	Incumbent Spending
Incumbent party presidential vote share	−0.085***	−0.086***
Incumbent terms	−0.070***	−0.044*
Leadership position, incumbent	1.265***	11.455***
Chair or ranking committee member	−0.084	0.947***
Beginning cash, incumbent	−0.117***	0.155***
Previous nominee, challenger	0.070	−0.047
Held office, challenger	1.629***	2.145***
State legislator, challenger	1.061***	0.605**
Former representative, challenger	3.518***	3.198***
Age of incumbent	0.005	−0.035***
Beginning cash, challenger	12.194***	6.900***
Year 1982	0.117	0.354
Year 1984	0.362	0.959*
Year 1986	0.816*	2.016***
Year 1988	0.826*	2.460***
Year 1990	0.435	2.353***
Year 1992	0.554	3.201***
Year 1994	0.616	2.380***
Year 1996	1.866***	4.544***
Year 1998	1.357***	4.610***
Year 2000	2.450***	6.071***
Year 2002	2.413***	5.965***
Year 2004	1.769***	7.103***
Year 2006	4.163***	10.121***
Democrat × Year 1980	0.727*	−0.272
Democrat × Year 1982	0.590	0.364
Democrat × Year 1984	0.482	0.463
Democrat × Year 1986	−0.356	−0.214
Democrat × Year 1988	−0.425	−0.376
Democrat × Year 1990	0.102	−0.035
Democrat × Year 1992	0.113	0.267
Democrat × Year 1994	1.062**	1.344***
Democrat × Year 1996	−0.286	−0.900*
Democrat × Year 1998	0.304	−0.921*
Democrat × Year 2000	−0.761	−0.832*
Democrat × Year 2002	−1.299***	−0.562
Democrat × Year 2004	0.102	−1.202**
Democrat × Year 2006	−2.665***	−3.868***
Constant	1.306***	4.780***
Observations	4,557	4,557
R^2	0.219	0.354
F-statistic for instrumental variables	92.50***	28.91***

*, **, *** indicate that the coefficient is statistically significant at the 10%, 5%, 1% levels, respectively.

legislator, or been a former representative, and when the challenger has cash on hand at the start of the campaign. Young incumbents, and those in office for few terms, also spend more money, as do those in leadership positions and who are chairs or the ranking members of committees. The latter characteristics make it much easier for the incumbents to raise money. Finally, incumbents spend more money during the election if they have cash available at its start. There is a clear time trend upward in spending for both challengers and incumbents, but there are only a few years in which there is a significant difference between Democrats and Republicans in spending (once the other variables are controlled for). In 1994, Democrats spent significantly more than Republicans, while in 2006 the reverse was true. These estimates are consistent with the theory that candidates who are facing a hostile political climate (Democrats in 1994 and Republicans in 2006) try to compensate by spending more money during the election campaign.

The instrumental variables are shown in bold in Table 1. The F-statistics testing the hypothesis that all the coefficients on the instrumental variables are zero are shown at the bottom of the table. A rule of thumb is that F-statistics below 10 indicate that the instruments are weak, which Staiger and Stock (1997) show can lead to biased coefficient estimates, so the F-statistics of 29 and 93 in the challenger and incumbent spending regressions are reassuring.

Table 2 presents the results of the voting regression. The dependent variable is the incumbent's share of the two-party vote in the district. The first two columns of numbers present the coefficient estimates from OLS regression, in which the candidate spending variables are assumed to be exogenous. The first column shows the common result in the literature: spending by challengers significantly reduces the incumbent's share of the vote, but spending by incumbents also appears to hurt the incumbent, and both coefficients are statistically significant at the 1 percent level. This result is likely driven by the fact that the OLS regression treats spending by incumbents as exogenous when in reality the incumbents increase their efforts to raise money and spend it in the campaign as the race tightens, or their share of the vote declines.

The second column adds an interaction term between challenger spending and incumbent spending. The coefficient on the interaction term is positive and statistically significant at the 1 percent level, which means that the positive effect of incumbent spending on his share of the vote rises as challenger spending increases. Equivalently, the reduction in the incumbent's share of the vote caused by an increase in challenger spending gets smaller as incumbent spending increases. The result is consistent with the hypothesis proposed in this article that spending by incumbents is primarily useful in countering spending by challengers.

The two-stage least squares estimates are very similar. Without the interaction term in the model, challenger spending significantly reduces the incumbent's share of the vote (an extra $100,000 in challenger money lowers the incumbent's vote share by 0.85 percentage points). Extra spending by the incumbent has no significant impact on her share of the votes received,

TABLE 2

OLS and Instrumental Variable Regressions

Variable	Ordinary Least Squares		Two-Stage Least Squares	
Challenger spending	−0.646***	−1.278***	−0.852***	−2.431***
Incumbent spending	−0.179***	−0.370***	0.171	−0.117
Challenger × Incumbent spending		0.035***		0.090***
Incumbent party presidential vote	0.429***	0.402***	0.443***	0.341***
Incumbent terms	−0.039	−0.067**	−0.016	−0.095*
Leadership position, incumbent	1.804**	2.491***	−1.994	−0.404
Chair/ranking committee member	0.486	0.698*	0.121	0.133
Beginning cash, incumbent	0.273***	0.242***	0.189**	0.130
Previous nominee, challenger	−0.894***	−0.919***	−0.857***	−0.613*
Held office, challenger	−1.977***	−1.584***	−2.394***	−0.970
State legislator, challenger	−1.290***	−1.108***	−1.286***	−0.372
Former representative, challenger	−1.140	−0.393	−1.522	−0.106
Year 1982	−6.358***	−6.025***	−6.472***	−6.072***
Year 1984	0.533	0.785	0.266	0.773
Year 1986	−1.838**	−1.292*	−2.365**	−1.093
Year 1988	−0.008	0.551	−0.678	0.563
Year 1990	−5.618***	−5.162***	−6.316***	−5.523***
Year 1992	−5.217***	−4.507***	−6.180***	−5.129***
Year 1994	0.719	1.344*	0.046	1.055
Year 1996	−4.427***	−3.555***	−5.604***	−3.258*
Year 1998	−3.130***	−2.096***	−4.431***	−2.436
Year 2000	−1.357*	−0.878	−2.932*	−0.062
Year 2002	−0.151	0.688	−1.696	1.229
Year 2004	−2.631***	−1.580**	−4.699**	−2.175
Year 2006	−6.031***	−5.441***	−8.652***	−4.974
Democrat × Year 1980	−2.811***	−2.468***	−2.574***	−1.791*
Democrat × Year 1982	8.233***	8.431***	8.233***	8.780***
Democrat × Year 1984	−3.314***	−2.977***	−3.379***	−2.803***
Democrat × Year 1986	4.547***	4.488***	4.537***	3.964***
Democrat × Year 1988	0.962	0.818	0.987	0.333
Democrat × Year 1990	3.295***	3.349***	3.302***	3.288***
Democrat × Year 1992	2.551***	2.616***	2.458***	2.500***
Democrat × Year 1994	−6.925***	−6.491***	−7.188***	−6.066***
Democrat × Year 1996	3.967***	4.062***	4.218***	3.933***
Democrat × Year 1998	3.257***	3.082***	3.636***	3.720***
Democrat × Year 2000	2.054***	2.362***	2.190***	1.571**
Democrat × Year 2002	−1.468**	−1.347*	−1.523**	−2.709**
Democrat × Year 2004	2.483***	2.512***	2.926***	2.880***
Democrat × Year 2006	8.044***	8.247***	8.860***	7.350***
Constant	68.025***	69.323***	67.181***	70.078***
Observations	4,557	4,557	4,557	4,557
R^2	0.596	0.633	0.506	0.511

*, **, *** indicate that the coefficient is statistically significant at the 10%, 5%, 1% levels, respectively.

with the point estimate suggesting that an extra $100,000 raises the incumbent vote share by 0.17 percentage points. This small positive coefficient is more plausible than the significantly negative coefficient in the OLS column 1 results.

Adding the interaction term shows that the impact of challenger spending on the election depends on how much the incumbent spends. The interaction term is positive and statistically significant, so a given increase in challenger spending has a smaller and smaller impact on the election outcome as the incumbent spends more money. Based on the estimates, the impact of spending by challengers is $\frac{\partial vote_{it}}{\partial S_{chall,it}} = -2.431 + 0.09 \times S_{inc,it}$. Thus, when incumbents spend nothing in the race, $100,000 extra in spending by the challenger subtracts about 2.4 percentage points from the incumbent's share of the vote. The spending variables are measured in hundreds of thousands of dollars, so when an incumbent spends $1 million ($S_{inc,it} = $ **10**), the extra $100,000 in challenger spending subtracts 1.53 percentage points from the incumbent's share of the vote. The estimates suggest that if an incumbent spends $2.7 million, then he can completely neutralize the effects of increased challenger spending, $\frac{\partial vote_{it}}{\partial S_{chall,it}} = 0$. A little over 1 percent (54 of 4,557) of the incumbents in the regression spent more than this amount.

An alternative way of viewing the results is that the benefit of incumbent spending rises with challenger spending. The effect of incumbent spending on the election outcome is $\frac{\partial vote_{it}}{\partial S_{inc,it}} = -0.117 + 0.09 \times S_{chall,it}$. Thus, spending by the incumbent raises his share of the vote if the challenger spends more than $130,000. Challengers spending less than that amount of money are not viable candidates. Of the 2,869 races in the sample in which a challenger spent less than $130,000, challengers won only three (0.1 percent) of them. Challengers won 205 of the 1,688 races (12 percent), on the other hand, in which they spent more than $130,000. Thus, spending by incumbents improves their share of the vote in virtually all races in which the challenger has a chance of winning. When a challenger spends $1 million, an extra $100,000 in spending by the incumbent raises her share of the vote by 0.78 percentage points.

One question common in the literature is whether incumbent spending and challenger spending have an equal impact in magnitude on the vote outcome. The two-stage least squares estimates (2SLS) in the last column of Table 2 suggest that the answer to this question depends on the level of spending by each candidate. At the average values of spending for challengers and incumbents, the estimated impact of $100,000 in extra campaign spending by challengers (1.82 percentage points more for the challenger) is much larger than the estimated impact of a similar increase in spending for the incumbent (0.09 percentage points more for the incumbent). Only 3.7 percent of the races (167 of 4,557) had spending levels that were high enough so that the marginal impact of incumbent spending was estimated to be greater than

the impact of challenger spending. Thus, in the vast majority of cases, the estimates support the conventional wisdom that challenger spending is more effective than incumbent spending in winning over voters.

Extensive robustness checks show that the coefficient on the incumbent-challenger spending interaction term is consistently positive and significant and is not sensitive to the particular instruments in the model. In addition to being robust to the choice of instruments, there are several other things that are reassuring about the two-stage least squares results presented in Table 2. First, the estimates are similar to those in the OLS regressions (and to the fixed-effects results presented later in Table 3) and thus the conclusions are not being driven by spurious instruments. Second, the high F-statistics on the instruments in the first-stage regressions lessen the concern that weak instruments are causing biased results. Finally, neither of the variables used as instruments is statistically significant at the 10 percent level when included in the voting equation. One final robustness check involves allowing diminishing returns for the impact of challenger and incumbent spending on vote shares. This is commonly done in the literature (see, e.g., Stratmann 2009) either by replacing the spending variables with the natural log of spending or by using the square root of spending. In each case, the coefficient on the interaction term between the challenger and incumbent spending variables remains positive and statistically significant at the 1 percent level in the 2SLS estimates.

The other coefficients in Table 2 are fairly consistent across the regressions and are intuitive. An extra percentage point in the district's vote for the presidential candidate from the House incumbent's party translates into roughly 0.4 percentage points more for the House incumbent in his reelection bid. In three of the four regressions, an incumbent who begins the campaign with a large amount of cash on hand does significantly better in the election, even after controlling for how much each candidate ultimately spends. This could be caused by a large war chest scaring off quality challengers. This result is consistent with Box-Steffensmeier (1996), who finds that larger incumbent war chests deter entry by high-quality challengers. Milyo and Groseclose (1999), on the other hand, conclude that incumbent wealth does not deter challengers, and Goodliffe (2001) finds no significant effect of war chests on the probability of entry by high-quality challengers.

Experienced challengers pose more of a threat to the incumbent: challengers get a larger share of the vote if they were the previous nominee, had held office, or had been a state legislator. Finally, Republicans did well, all else equal, in 1980 and 1984 (President Reagan's election year coattails), 1994 (President Clinton's first midterm election and the Contract with America), and 2002 (President Bush's popularity following September 11 and the invasion of Afghanistan), while Democrats did well in most of the remaining years, particularly in the midterm elections other than 2002 under Republican presidents (1982, 1986, 1990, and 2006).

TABLE 3

Regressions Using Sample of Repeat Elections

Variable	Ordinary Least Squares		Fixed Effects for Candidate Pair	
	Coefficients	Coefficients	Coefficients	Coefficients
Challenger spending	−1.017***	−1.995***	−0.342***	−0.654***
Incumbent spending	−0.116**	−0.497***	0.098*	−0.031
Challenger × Incumbent spending		0.065***		0.017***
Incumbent party presidential vote	0.443***	0.394***	0.334***	0.326***
Year 1974	−8.686***	−7.553***	−9.057***	−8.819***
Year 1976	−2.943	−2.383	−4.639***	−4.298***
Year 1978	−1.164	−0.075	−0.761	−0.202
Year 1980	5.981***	6.528***	0.807	1.602
Year 1982	−2.302	−0.155	−5.878***	−4.819***
Year 1984	4.454**	5.456***	−1.105	−0.052
Year 1986	1.057	2.861	−2.105	−1.044
Year 1988	3.722*	5.490***	−1.375	−0.123
Year 1990	−2.908	−1.614	−7.492***	−6.350***
Year 1992	−1.217	1.001	−3.861*	−2.382
Year 1994	5.449**	7.292***	0.978	2.390
Year 1996	0.822	3.265*	−3.408	−1.878
Year 1998	2.858	4.608**	−2.225	−0.789
Year 2000	4.265**	6.402***	−2.163	−0.699
Year 2002	5.171**	7.138***	0.061	1.421
Year 2004	2.658	4.686**	−1.300	0.096
Year 2006	1.096	0.409	−5.689**	−4.717*
Democrat × Year 1972	1.955	2.308	−5.050**	−4.319**
Democrat × Year 1974	13.937***	12.424***	8.365***	8.693***
Democrat × Year 1976	6.684***	6.734***	5.484***	5.729***
Democrat × Year 1978	2.699	2.639*	0.547	0.706
Democrat × Year 1980	−5.629***	−4.636***	−3.096**	−2.954**
Democrat × Year 1982	7.217***	6.584***	7.534***	7.552***
Democrat × Year 1984	−3.279**	−2.495*	−0.721	−0.686
Democrat × Year 1986	6.408***	6.075***	5.230***	5.315***
Democrat × Year 1988	0.679	−0.021	3.254**	3.137**
Democrat × Year 1990	4.954***	4.646***	6.268***	6.253***
Democrat × Year 1992	2.706	2.277	1.523	1.340
Democrat × Year 1994	−7.521***	−7.098***	−4.901***	−5.028***
Democrat × Year 1996	3.575***	3.187**	5.155***	4.930***
Democrat × Year 1998	2.675*	2.189*	5.026***	4.841***
Democrat × Year 2000	3.252**	2.102	5.978***	5.648***
Democrat × Year 2002	−1.316	−1.497	−0.080	−0.176
Democrat × Year 2004	3.183**	3.222***	2.634	2.610
Democrat × Year 2006	6.985***	9.559***	9.505***	9.831***
Constant	62.416***	64.023***	63.962***	63.929***
Observations	1,373	1,373	1,373	1,373
R^2	0.616	0.676	0.523	0.579

*, **, *** indicate that the coefficient is statistically significant at the 10%, 5%, 1% levels, respectively.

Table 3 presents the results of estimates from a sample of elections in which the same challenger and incumbent faced each other in more than one election. The first two columns present OLS estimates on this sample of repeated elections, and the results are similar to those in Table 2. Once again, challenger spending significantly reduces the incumbent's share of the vote, and the interaction term between challenger and incumbent spending is positive and statistically significant.

The last two columns present estimates including fixed effects for each candidate pair. When candidate-pair fixed effects are included but there is no interaction term between the spending variables (column 3), the coefficient on challenger spending remains negative and statistically significant. The point estimate is about one-third as large as that in the OLS estimate of column 1, which shows that controlling for unobserved candidate quality does reduce the estimated impact of challenger money on election outcomes. With candidate fixed effects, the coefficient on incumbent spending is now positive and statistically significant at the 10 percent level. The point estimate suggests that an extra $100,000 in spending by the incumbent raises her share of the vote by about 0.1 percentage points. These estimates suggest that the impact of incumbent spending on the election outcome is smaller than the effect of challenger spending. It would take roughly $3.50 in spending by the incumbent to offset $1 in extra challenger spending.

The final column includes an interaction term between challenger and incumbent spending. As in Table 2, the positive and statistically significant coefficient on the interaction term supports the view that incumbent spending is most useful as a way to counteract spending by the challenger. The impact of spending by challengers on the incumbent's share of the vote is $\frac{\partial vote_{it}}{\partial S_{chall,it}} = -0.654 + 0.017 \times S_{inc,it}$. Challenger spending is most effective when it is not countered by the incumbent.

Incumbent spending has no significant impact on the election when challengers spend nothing. The effect of incumbent spending on his share of the vote is $\frac{\partial vote_{it}}{\partial S_{inc,it}} = -0.031 + 0.017 \times S_{chall,it}$. Spending by the incumbent, then, raises his share of the vote if the challenger spends more than $182,000, which is not far from the estimate in Table 2 about when spending by the incumbent begins to have a positive effect on her share of the vote.

The results are thus remarkably consistent across different estimation methods. Whether using OLS, instrumental variables, or fixed-effects regressions, incumbent spending is found to have a significant effect on election outcomes only in those races where challengers spend a lot of money.

Figure 1 illustrates the estimated effects of incumbent spending on the share of the two-party vote the incumbent receives. The figure shows the marginal effect of incumbent spending on vote share for different levels of

FIGURE 1

Effect of Incumbent Spending on Incumbent Vote Share
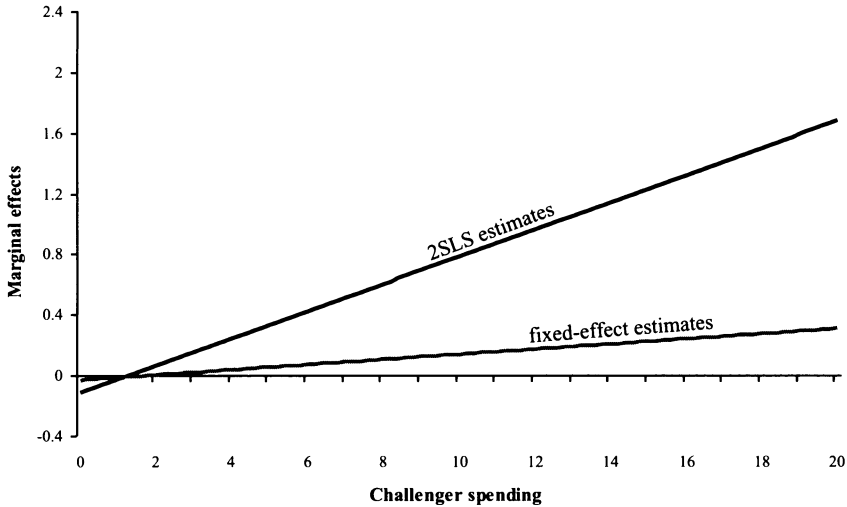
challenger spending. For both the two-stage least squares estimates and the fixed-effect estimates, the impact of incumbent spending on the vote share rises as challengers spend more money. While the effect of extra incumbent spending is close to zero if the challenger spends $200,000, the impact of an extra $100,000 spent by the incumbent rises to 1.7 percentage points in the 2SLS regression (0.31 percentage points in the fixed-effects regression) when the challenger spends $2 million.

Figure 2 shows that increased spending by the incumbent is able to reduce the effectiveness of spending by the challenger. When an incumbent spends nothing, the models estimate that $100,000 of spending by the challenger raises her share of the vote by 2.4 percentage points in the 2SLS regression or by 0.65 percentage points in the fixed-effects regression. If the incumbent spends $2 million, on the other hand, the gain to the challenger of an extra $100,000 in campaign money is only between 0.3 and 0.6 percentage points (from the fixed-effects and 2SLS regressions, respectively).

The figures reveal the much smaller estimated impacts of spending on election outcomes in the fixed-effects regression than in the instrumental variables regression. This result may be caused by the fact that the fixed effects do a better job than the 2SLS regression of controlling for differences in candidate quality. Levitt (1994) also found very small effects of money on election outcomes when he included candidate-pair fixed effects.

FIGURE 2

Effect of Challenger Spending on Challenger Vote Share
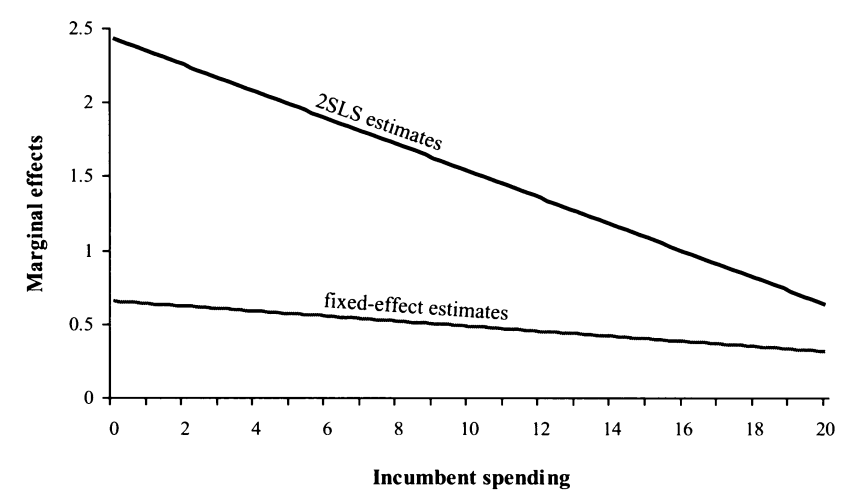
Conclusion

This article develops and tests a theory that incumbent spending has the largest immediate impact on election outcomes when the incumbent is forced to respond to a serious challenge. Since challengers are less well known, voter opinions about the challenger are more flexible than voter opinions about the incumbent. In races where challengers have enough money to spend introducing themselves to voters, incumbents have an incentive to run advertisements seeking to define the challenger in less-positive ways. These negative advertisements can be very effective and can have a large impact on the current election. Incumbents will not spend money on negative advertisements, however, if the challenger does not have the financial resources to be competitive. In such cases, the incumbent prefers to run a positive campaign designed to build up her own brand-name capital. This type of campaign can provide some long-term gains for the incumbent but has a relatively small impact on the current election.

This theory thus provides an explanation of the puzzle surrounding campaign spending by incumbents: why they would bother to raise and spend money if their expenditures have no effects on their election chances as most previous papers have found. The theory's prediction that incumbent spending is most effective when challenger spending is considerable finds remarkably consistent support from the empirical tests. In OLS, two-stage least squares, and fixed-effects regressions, campaign spending by incumbents has a significant positive effect on the incumbent's share of the vote only when challengers spend a sufficiently large amount of money in their election efforts.

The empirical results are consistent with the idea that different types of campaign spending have diverse impacts on the election outcome. A fruitful line of future research would be to break campaign spending down into categories and estimate which types of spending touch voters and change their preferences. This article also suggests that it is important to extend the research on the effects of positive and negative campaign advertisements.

The results explain why most previous studies have found that incumbent spending has a minimal impact on election outcomes. Studies that assume the effect of incumbent spending is identical across districts have identified the average effectiveness of extra incumbent spending across all districts. In most districts, challengers spend very little money and incumbent spending is relatively ineffective, which pulls down the average impact of incumbent spending on voting outcomes. Even though campaign money may be unimportant for incumbents in most cases, it is perfectly rational for them to be active fundraisers. In the event that they face a serious challenge by a well-funded opponent, being able to spend extra money in the campaign can greatly increase their chances of reelection.

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