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The Paradox of Less Effective Incumbent Spending: Theory and Tests

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In this article, the reason why incumbent spending is less effective than challenger spending is explained. The argument is that incumbent spending efficiency depends on the marginality of seats: safe incumbent spending is less effective than marginal incumbent spending, since safe incumbents have to buy fewer extreme voters, whereas marginal incumbents can easily buy a larger number of swing voters. The analysis of the US Senate elections between 1974 and 2000 shows that safe incumbent spending is less effective than challenger spending, but marginal incumbent spending is not. The analysis also shows that the previous finding of less effective incumbent spending is largely due to the fact that the data for marginal and safe incumbents have been aggregated.

In the literature on congressional electoral competition, the crucial question of how incumbent campaign spending affects electoral performance remains unanswered. Jacobson's ordinary least squares (OLS) regression model shows that incumbent campaign spending in the United States had an insignificant effect on House incumbent vote shares in 1972 and 1974.[1] Given the oddity of this finding, Jacobson reasons that incumbent campaign spending has an insignificant effect on the vote because of incumbents' strategic campaign fund raising: that is, the larger the vote incumbents expect, the less money they raise and spend, because those sure of victory feel no need for the money. Strategic fund raising generates a problem of reciprocal causation since spending affects the vote and the vote also affects spending. To correct the reciprocal causation problem, Jacobson employs a two-stage least squares (2SLS) regression model, but he finds that incumbent spending is less effective than challenger spending. To explain this result, Jacobson offers a thesis that incumbents attract few additional voters since they are already well-known to voters and additional campaign spending will add little to the voters' knowledge. In contrast, additional campaign spending by challengers can buy the necessary voter recognition. In short, incumbent spending is less effective than challenger spending because of incumbent recognition advantages.

However, Jacobson's explanation is not immune to scepticism. Incumbents enhance their electoral prospects not only by letting their name be known better but also by advertising new issues or services favourable to their electoral chances and by negative campaigning against challengers.[2] Moreover, given that incumbents have advantages in their offices and expertise in credit taking and in negative campaigning, it is still puzzling why incumbent spending is less effective than challenger spending. To solve this puzzle, subsequent studies have employed alternative 2SLS specifications or a more refined

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[1] Gary C. Jacobson, 'The Effects of Campaign Spending in Congressional Elections', *American Political Science Review,* 72 (1978), 469–91.

[2] Alan Gerber, 'Estimating the Effect of Campaign Spending on Senate Election Outcomes Using Instrumental Variables', *American Political Science Review*, 92 (1998), 401–11.

measurement for campaign spending, but most of them, except for Gerber, found that incumbent spending is less effective than challenger spending.[3]

It is not only the US scholars but also their British counterparts who find that incumbent spending is less effective than challenger spending. Johnston and Pattie find the same result from their pioneering studies of the British general elections, in which the electoral mechanism that Jacobson uses to explain less effective campaigns by incumbents does not operate.[4] Unlike the United States, in Britain incumbents do not enjoy the name recognition advantage, since British electors vote for parties and constituency campaigns are 'oriented towards "getting out the vote" '.[5] The British case provides an important implication that candidates' personal factors, such as name recognition, might not be relevant in explaining less effective incumbent spending. Jacobson's observation of less effective incumbent spending might have resulted from the electoral mechanism that exists universally.[6]

In this article, I propose a theoretical model to explain this mechanism. Previous studies have focused on methodological solutions. I argue that incumbent spending efficiency depends on the marginality of their seats; that is, safe incumbent spending is less effective than marginal incumbent spending. I derive this explanation from a spatial model in which two candidates spend their resources to sway citizens' ideological voting decisions (or mobilize supporters who might otherwise abstain).[7] The model suggests that marginal incumbent spending is more effective than safe incumbent spending, since the former can easily win extra votes from centrists (or mobilize voters who support the incumbent but might abstain without canvassing). In contrast, the incumbent who had won the previous

[3] Alan I. Abramowitz, 'Explaining Senate Election Outcomes', *American Political Science Review*, 82 (1988), 385–403; Alan I. Abramowitz, 'Incumbency, Campaign Spending, and the Decline of Competition in U.S. House Elections', *Journal of Politics*, 53 (1991), 34–56; Stephen Ansolabehere and Alan Gerber, 'The Mismeasure of Campaign Spending: Evidence from the 1990 U.S. House Elections', *Journal of Politics*, 56 (1994), 1106–18; Donald P. Green and Jonathan S. Krasno, 'Salvation for the Spendthrift Incumbent', *American Journal of Political Science*, 32 (1988), 844–907; Donald P. Green and Jonathan S. Krasno, 'Rebuttal to Jacobson's "New Evidence for Old Argument" ', *American Journal of Political Science* 34 (1990), 363–72; Gary C. Jacobson, 'The Effects of Campaign Spending in House Elections: New Evidence for Old Arguments', *American Journal of Political Science*, 34 (1990), 334–62; Steven D. Levitt, 'Using Repeat Challengers to Estimate the Effect of Campaign Spending on Election Outcomes in the U.S. House', *Journal of Political Economy*, 102 (1994), 777–98.

[4] R. J. Johnston, C. J. Pattie and L. C. Johnston, 'The Impact of Constituency Spending on the Result of the 1987 British General Election', *Electoral Studies*, 8 (1989), 143–55; C. J. Pattie, R. J. Johnston and E. A. Fieldhouse, 'Winning the Local Vote: The Effectiveness of Constituency Campaign Spending in Great Britain, 1983–1992', *American Political Science Review*, 89 (1995), 963–83; C. J. Pattie and R. J. Johnston, 'The Impact of Spending on Party Constituency Campaigns at Recent British General Elections', *Party Politics*, 1 (1995), 261–73; C. J. Pattie and R. J. Johnston, 'The Value of Making an Extra Effort: Campaign Spending and Electoral Outcomes in Recent British General Elections – A Decomposition Approach', *Environment and Planning A*, 28 (1996), 2081–90; R. J. Johnston and C. J. Pattie, 'Where's the Difference? Decomposing the Impact of Local Election Campaigns in Great Britain', *Electoral Studies*, 16 (1997), 165–74; David Denver and Gordon Hands, 'Challengers, Incumbents and the Impact of Constituency Campaigning in Britain', *Electoral Studies*, 16 (1997), 175–93.

[5] David Denver and Gordon Hands, 'Challengers, Incumbents and the Impact of Constituency Campaigning in Britain'; Johnston and Pattie, 'Where's the Difference?' p. 169.

[6] The recent analysis of the National Assembly elections in South Korea yields the same result – that incumbent spending is less effective than challenger spending. See Myungsoon Shin, Youngjae Jin, Donald A. Gross and Kihong Eom, 'Money Matters in Party-centered Politics: Campaign Spending in Korean Congressional Elections', *Electoral Studies*, 24 (2005), 85–101.

[7] I thank Hugh Ward and anonymous *Journal* referees for pointing out two possible interpretations of the effects of campaign spending. As they commented, constituency campaign spending could be seen as a means of winning over support from people who might otherwise vote for another candidate, but constituency campaign spending in Britain is more a means of mobilizing supporters who might otherwise abstain.

election by a greater margin must sway extremist voters (or mobilize relatively weak supporters who might otherwise abstain, solicit support from neutral voters, and 'get out the votes' from voters who weakly support opponents but might abstain). Since it is more expensive for a safe incumbent to sway extremists (or to mobilize weaker supporters, independents or weak supporters of opponents), safe incumbent spending is less effective. In other words, as an incumbent's previous vote margin increases, incumbent spending becomes less effective.

This finding is consistent with the findings of Erickson and Palfrey, who prove that marginal incumbent spending is more effective than safe incumbent spending in House elections.[8] According to Erickson and Palfrey's game theoretical model, the simultaneity bias resulting from the reciprocal effect of the vote on spending is insignificant in competitive races but significant in lopsided races. Their OLS estimates support their model's prediction: the effect of marginal incumbent spending is significant but the effect of safe incumbent spending is largely insignificant.

While Erickson and Palfrey make a valuable contribution to the understanding of why marginal incumbent spending is more effective than safe incumbent spending, what remains still puzzling is *why spending by safe incumbents is less effective than spending by challengers against them*. According to Erickson and Palfrey, the effect of safe incumbent spending is deflated due to the simultaneity bias, but the effect of challenger spending against safe incumbents would not be biased downward. To support this argument, Erickson and Palfrey offer several interpretations of why challengers do not spend less even when they have no chance of winning safe seats. First, challengers against safe incumbents tend to be inexperienced and thus spend money inefficiently. Secondly, they estimate electoral prospects with greater noise. Thirdly, the simultaneity bias is fundamentally asymmetric between incumbents and challengers; i.e., new incumbent spending increases the incumbent vote, which decreases the value of spending further, whereas new challenger spending increases the challenger vote, which increases the value of spending further.

Although there are several reasons why the effect of safe incumbent spending is deflated compared to the effect of challenger spending, one can also find reasons that inflate the effect of safe incumbent spending. First, safe incumbents tend to receive big contributions from political action committees, whereas challengers have to rely more on their own funds and small contributions.[9] Secondly, whereas challengers against safe incumbents tend to be inexperienced and thus spend money inefficiently, incumbents sure of victory are less frugal and thus spend money inefficiently. In short, the simultaneity bias that affects safe incumbent spending could be inflationary and challenger spending could be biased downward.

The electoral competition model I offer in this article shows that challenger spending is more effective than safe incumbent spending. According to the model, a safe incumbent has to buy extremist voters in the current election. In contrast, when a challenger spends against the safe incumbent, she can easily buy voters since the first voters the challenger

[8] Robert S. Erickson and Thomas R. Palfrey, 'Equilibria in Campaign Spending Games: Theory and Data', *American Political Science Review*, 94 (2000), 595–607. Denver and Hands find a similar result from their analysis of British general elections; see Denver and Hands, 'Challengers, Incumbents and the Impact of Constituency Campaigning in Britain'.

[9] Larry Makinson, Joshua Goldstein and Center for Responsive Politics, *Open Secrets: The Encyclopedia of Congressional Money and Politics* (Washington, D.C.: Congressional Quarterly, 1994).

wins are those who support the challenger's policy position but who were swayed by the incumbent's spending in the previous election.

What distinguishes this article from previous studies is that the model in this article predicts that safe incumbent spending is less effective than challenger spending *even when incumbents and challengers are equally well known, equally efficient in spending and equally able to estimate their electoral prospect*. I test the prediction in the context of the US Senate elections since senatorial elections are more appropriate to control for the many personal factors that generate the reciprocal causation problem found in House elections.

First, challengers in Senate elections are experienced candidates, who are less likely to spend money inefficiently or make an incorrect estimate of their own electoral prospects. Thus, unlike House elections, the effects of incumbent and challenger spending are equally affected by the simultaneity bias. Therefore, if the effect of Senate incumbent spending is biased downwards, the effect of challenger spending would be biased downwards too. This implies that if Senate incumbent spending is significantly less effective than challenger spending, the difference in effectiveness does not come from the asymmetric simultaneity bias.

Next, candidates in Senate elections are more likely to dispense with asymmetric name recognition between incumbents and challengers in House elections. According to Jacobson, House incumbent campaign spending has an insignificant effect on their vote shares since House incumbents are already well known to voters.[10] Senate incumbents would not enjoy such a recognition advantage over their challengers, since challengers in Senate elections are relatively well recognized by voters. Thus, if Jacobson's name recognition thesis is correct, we have to find evidence that spending by challengers against Senate incumbents is not particularly more effective than spending by Senate incumbents. However, if we find evidence that Senate challengers are much more effective than Senate incumbents, this implies that less effective spending by Senate incumbents stems from a reason other than the difference in name recognition between incumbents and challengers.

The analysis of the Senate elections between 1974 and 2000 shows that incumbent spending is less effective than challenger spending, as in the House of Representatives elections. The analysis also shows that the previous finding of less effective incumbent spending is largely due to the fact that data from marginal and safe incumbents are aggregated. By disaggregating the data from marginal and safe incumbents, this article shows that safe incumbent spending is less effective than challenger spending, although marginal incumbent spending is not.

This article is organized as follows. First, I propose an electoral competition model that explains incumbent vote shares. I derive a testable hypothesis from this model. Secondly, I specify two statistical models to test the hypothesis and I report the results. In conclusion, I discuss the policy implications of the findings and a direction for further research.

ELECTORAL COMPETITION MODEL

The core idea of this article is that the cost of swaying voters for an incumbent candidate varies with the safety of the incumbent's seat. The article illustrates that it is more costly for a safe candidate to buy extra votes than a marginal candidate. This is true because the safer a candidate's seat, the more expensive extremist votes will be to gain. If we assume

[10] Jacobson, 'The Effects of Campaign Spending in Congressional Elections'.

that the primary goal of campaigning is to mobilize voters, the same logic applies: that is, the cost of mobilizing voters for an incumbent candidate varies with the safety of the incumbent's seat. It is more costly for a safe candidate to mobilize potential voters than for a marginal candidate to do so, since the safer candidate had already mobilized voters who were more supportive of the candidate's policy position in the previous election and must now get out the votes from those who are less supportive.

In order to incorporate this idea, I offer a model in which candidates spend their resources to mobilize constituents who otherwise abstain. This model also applies to a situation in which candidates spend their resources to sway voters' ideological decisions. I first describe the voters. I assume a continuum of citizens, characterized by their ideal points for policy. I denote a citizen by his or her ideal point, $\theta \in [0, 1]$. I also assume that the distribution of ideal points, $\varphi(\theta)$, is a continuous, non-zero and differentiable function over the interval [0,1]. Next, I describe the candidates. Two candidates, L and R, compete for votes by choosing policy positions x_L and $x_R \in [0, 1]$. I denote candidate L's and R's campaign spending respectively by r_L and $r_R \in \mathbf{R}$.

Next, I define the utility function of citizens. The utility of the citizen increases (1) as his ideal point and the policy position of a candidate become closer, and (2) as the amount of the candidate's spending used to advertise his merits increases. I further assume that the more extreme the citizen is, the less likely his utility is to be affected by the opposition candidate's campaign spending.[11] Simple mathematical representations of the citizen's utilities from the two candidates' proposals are as follows:

$$\begin{cases} u^L(x_L, r_L; \theta) = (1-\theta)r_L - (x_L - \theta)^2 \\ u^R(x_R, r_R; \theta) = \theta r_R - (x_R - \theta)^2 \end{cases} \tag{1}$$

Here, u^i denotes the citizen's utility from candidate i. Definition (1) shows that the citizen's utility is a linear increasing function of candidate i's resource spending and a quadratic function of the difference between the citizen's ideal point and candidate i's policy position. Definition (1) also captures the assumption that the citizen's utility is less affected by the more distant candidate's campaign than the closer candidate's. According to (1), if the citizen's ideal point is located at the midpoint between 0 and 1, for example, the citizen is equally affected by candidate L's or R's spending. If the citizen's ideal point is located at 0, the citizen is not affected by candidate R's spending.

A citizen is indifferent between (x_L, r_L) and (x_R, r_R) if $u^L(x_L, r_L; \theta) = u^R(x_R, r_R; \theta)$, which is equivalent to

$$(1-\theta)r_L - (x_L - \theta)^2 = \theta r_R - (x_R - \theta)^2. \tag{2}$$

Solving (2) for θ, we get the following equation, which defines the cutpoint, $\hat{\theta}$:

$$\hat{\theta} = \frac{r_L - x_L^2 + x_R^2}{r_L + r_R + 2(x_R - x_L)}. \tag{3}$$

The cutpoint is the ideal point of citizens who are indifferent between (x_L, r_L) and (x_R, r_R). If candidate L is located to the left of candidate R, citizens to the left of the cutpoint support

[11] The evidence for this assumption could be found in the public opinion literature. According to Zaller, a Republican voter tends to 'reject criticism of President Bush's budget plan if she recognizes that the person making the criticism is a Democrat' (John Zaller, *The Nature and Origins of Mass Opinion* (Cambridge: Cambridge University, 1992), p. 42).

candidate L and citizens to the right of the cutpoint support candidate R. If a citizen's ideal policy is the same as the cutpoint, she is indifferent between the two candidates.

I assume that citizens vote for a candidate if the cost of voting is not greater than the utility difference between the two candidates. Denoting the cost of voting by c, a citizen votes for candidate L over candidate R if $u^L(x_L, r_L; \theta) - u^R(x_R, r_R; \theta) \geq c$, which is equivalent to

$$(1-\theta)r_L - (x_L-\theta)^2 - \theta r_R + (x_R-\theta)^2 \geq c. \tag{4}$$

Solving (4) for θ, we get the following equation in which $\vec{\theta}$ represents the citizens who are nearest to candidate R among those who vote for candidate L.

$$\vec{\theta} = \frac{r_L - x_L^2 + x_R^2 - c}{r_L + r_R + 2(x_R - x_L)}. \tag{5}$$

We can also obtain the following equation for the citizens who are nearest to candidate L among those who vote for candidate R:

$$\overleftarrow{\theta} = \frac{r_L - x_L^2 + x_R^2 + c}{r_L + r_R + 2(x_R - x_L)}. \tag{6}$$

I define a vote fraction function. I define the fraction of citizens whose ideal policies are less than $\vec{\theta}$ by:

$$\Phi(\vec{\theta}) = \int_0^{\vec{\theta}} \varphi(\theta) d\theta. \tag{7}$$

Each candidate has a payoff function, $\Pi \in [0, 1]$, which represents a candidate's vote share as a function of (x_L, x_R). When candidate L's policy position is located to the left of candidate R's, candidate L wins votes to the left of $\vec{\theta}$ and candidate R wins votes to the right of $\overleftarrow{\theta}$. Citizens between $\vec{\theta}$ and $\overleftarrow{\theta}$ abstain since the cost of voting is greater than the utility difference between the two candidates. If two candidates with the same policy positions spend the same level of resources, each candidate will win half of the votes. Then the two candidates' payoff functions are:

$$\text{if } x_L < x_R,\ \Pi_L = \Phi(\vec{\theta}),\ \Pi_R = 1 - \Phi(\overleftarrow{\theta}), \tag{8}$$

$$\text{if } x_L = x_R,\ \begin{cases} \Pi_L = 1, & \Pi_R = 0 \quad \text{if } r_L > r_R, \\ \Pi_L = 0.5 & \Pi_R = 0.5 \quad \text{if } r_L = r_R, \\ \Pi_L = 0 & \Pi_R = 1 \quad \text{if } r_L < r_R. \end{cases} \tag{9}$$

If the cost of voting (c) is not zero, the objective of candidate L is to move $\vec{\theta}$ towards the right by mobilizing voters who are located to the right of $\vec{\theta}$. Similarly, candidate R tries to move $\overleftarrow{\theta}$ to the left by mobilizing voters who are located to the left of $\overleftarrow{\theta}$.

If the cost of voting (c) is zero, all citizens vote and $\vec{\theta}$ and $\overleftarrow{\theta}$ become the same as the cutpoint. In this setting, the objective of each candidate is to move the cutpoint towards the opponent and each candidate spends his or her resources to sway voters who support the opponent.

COMPARATIVE STATICS

In this article, I treat candidates' ideological positions exogenously and analyse how the change in candidates' spending affects their electoral performance.[12] First, I consider the change in $\vec{\theta}$ as a function of candidate L's spending. Differentiating $\vec{\theta}$ with respect to r_L, we get the following result if $r_R \geq 0$ (see Appendix for proof):

$$\frac{\partial \vec{\theta}}{\partial r_L} = \frac{c + r_R - 2x_L + x_L^2 + 2x_R - x_R^2}{(r_L + r_R + 2x_R - 2x_L)^2} > 0. \quad \text{(I)}$$

Result I shows that $\vec{\theta}$ is a strictly increasing function of r_L. That is, if candidate L increases her spending, she moves $\vec{\theta}$ towards the right and her vote share increases. More interesting is the rate at which candidate L's vote share changes as a function of her spending. Differentiating $\vec{\theta}$ twice with respect to r_L, we get the following result (see Appendix for proof):

$$\frac{\partial^2 \vec{\theta}}{(\partial r_L)^2} = -\frac{2(c + r_R - 2x_L + x_L^2 + 2x_R - x_R^2)}{(r_L + r_R + 2x_R - 2x_L)^3} < 0. \quad \text{(II)}$$

Result II shows that candidate L's spending increases $\vec{\theta}$ with a decreasing rate. That is, it becomes more expensive for candidate L to move $\vec{\theta}$ towards the right. The reason is that the first potential supporters candidate L can mobilize are those whose ideal position is closest to candidate L's. If candidate L wants to mobilize remaining potential voters, she has to spend more resources since these voters' ideal positions are farther from candidate L. If we assume that all citizens vote, candidates spend resources to buy votes by swaying voters. This assumption does not change the comparative statics result since plugging zero to c in Result II yields the same result.

The relationship between the safety of the incumbent's seat and the effectiveness of campaign spending depends on the distribution of voter preferences ($\varphi(\theta)$). First, assume that candidates spend their resources to mobilize potential voters. In this case, as the incumbent becomes safer, the marginal productivity of incumbent spending decreases as long as per capita cost for mobilizing more supportive voters is smaller than per capita cost for mobilizing less supportive voters.[13] Secondly, assume that candidates spend to sway voters. Then the marginal productivity of incumbent spending is decreasing as long as the distribution of voters to the right of the cutpoint is a decreasing function of voter preferences.[14] In this case, it is more expensive for a safer incumbent to move the cutpoint than for a marginal incumbent, *and* the extra votes the former can buy decrease. Therefore, marginal incumbent spending is more effective than safe incumbent spending.

The marginal productivity of challenger spending behaves differently from that of incumbent spending. First, assume that a challenger spends to mobilize potential supporters. In this case, a challenger can mobilize a substantial pool of potential supporters, whereas an incumbent, who has already mobilized some potential supporters in the previous election, has to mobilize remaining potential voters whose support is weaker than

[12] For a full model that solves the candidates' ideological positions at equilibrium, see Woojin Moon, 'Party Activists, Campaign Resources, and Candidate Position Taking in U.S. Senate Elections, 1974–2000: Theory, Tests, and Applications', *British Journal of Political Science*, 34 (2004), 611–33.

[13] Per capita cost for mobilizing more supportive voters is greater than per capita cost for mobilizing less supportive absentees if less supportive voters outnumber more supportive voters.

[14] When the distribution of voter preferences is bell-shaped (as in most empirical cases), the distribution of voters to the right of the cutpoint is a decreasing function of voter preferences.

those who were mobilized in the previous election. Secondly, assume that a challenger spends to sway voters who voted for an incumbent in the previous election. In this case, the challenger can easily sway voters since the first voters the challenger wins are those who support the challenger's policy position but who were swayed by the incumbent in the previous election. Therefore, challenger spending is more effective than incumbent spending.

EMPIRICAL TESTS

Testable Hypothesis

The model presented in the previous section predicts that safe incumbent spending is less effective than marginal incumbent spending. This result is directly related to the puzzle: why is incumbent spending less effective? To see this, consider an incumbent who is running for an election. In the US context where candidates try to buy votes, the incumbent would have won swing voters who are distributed around the centre in the previous election. If the incumbent wants to win extra voters in the current election, she has to win voters who were not swayed by the incumbent in the previous election. An incumbent's greater vote share in the previous election means that he or she can win fewer extremist voters in the current election. For example, an incumbent who won 80 per cent of votes has to target 20 per cent of extremist voters, whereas an incumbent who won 60 per cent of votes has to target fewer extremists in the remaining 40 per cent of the voters. Thus, the greater the vote share of an incumbent in the previous election, the less effective his spending becomes in buying extra votes in the current election. The model presented above predicts that marginal incumbent spending is more effective than that of safe incumbent spending. Thus, an important hypothesis to be tested in this article is:

HYPOTHESIS: *The greater the vote share of an incumbent in the previous election, the less effective the incumbent spending in subsequent elections.*

Model Specification: Searching for Omitted Variables in the OLS Regression or Better Instrumental Variables in the 2SLS Regression?

According to Jacobson, incumbent campaign spending has an insignificant or even a negative effect on the vote in House elections in 1972 and 1974 due to strategic campaign fund raising by candidates. For incumbents, the larger the vote they expect, the less money they raise and spend because incumbents sure of victory feel no need for the money. For challengers, how well they do in electoral contests is directly related to how much campaign money they raise and spend. Strategic fund raising generates a problem of reciprocal causation when we analyse the effects of spending on the vote because the dependent variable affects the independent variable. The effect of incumbent spending on the incumbent vote share is biased downward since incumbents spend less as their probability of winning increases. In contrast, the estimate for challenger spending on the challenger vote share is biased upward because challengers spend more when they see their chances of winning are improving. In other words, reciprocal causation generates simultaneity biases that underestimate the effect of incumbent spending and overestimate the effect of challenger spending.

To correct the simultaneity biases, Jacobson employs a methodological alternative to the OLS regression model: the two-stage least squares (2SLS) regression model.[15] According to Jacobson, candidate spending contains two components: (1) money that a candidate would spend regardless of his electoral prospects (for example, tastes for fund-raising, 'propensity' for spending, wealth levels and other exogenous factors that are independent of electoral prospects), and (2) money that would depend upon his electoral prospects. The unbiased effect of incumbent spending should capture the effect of the first component only. However, the OLS estimate for the effect of incumbent spending contains not only the first component but also the second component. In order to capture the effect of the first component only, one has to employ true instrumental variables (instrumental variables that are included in the first stage but excluded from the second stage of the 2SLS model) that directly affect candidate spending but not incumbent vote shares.

According to Jacobson, even after simultaneity biases are eliminated by means of the 2SLS regression model, incumbent spending is less effective than challenger spending. Jacobson theorizes that incumbent spending is less effective because incumbents, who already enjoy advantages in recognition, would attract few additional voters. In contrast, challengers can 'buy the necessary voter recognition already enjoyed by incumbents prior to the campaign'.[16] Subsequent studies do not agree with one another on the true instrument variables to be used in the 2SLS regression model, but they agree with Jacobson's finding that incumbent spending is less effective than challenger spending.[17]

In general, the degree of bias of the 2SLS estimates depends on how successful it is in finding the true instrumental variables that (i) directly affect the endogenous regressor but (ii) do not directly affect the dependent variable. Unless we are able to find instrumental variables that satisfy the two conditions above both for incumbent and for challenger spending, it seems hard to obtain consistent 2SLS estimates. It is not only this methodological but also the following theoretical problem that makes the 2SLS method less attractive. Scholars employing the 2SLS regression models assume that the vote affects spending. However, strictly speaking, it is not the vote, *which is a result of election,* but the candidate's *expectations* of electoral outcomes that affect their incentive to change their spending. In other words, as Abramowitz precisely points out, 'the real problem here is not reciprocal causality – the election outcomes cannot affect campaign spending – but the potential bias introduced by elite expectations'.[18] Thus, the correct model would be one that controls for factors that can be observed by incumbents when they still have time to raise more money.

In particular, if we speculate that the estimate for incumbent spending effect is biased downward, a desirable strategy is to find the omitted variables that hinder incumbents from winning more votes even when they spend more. Obvious factors that hinder incumbents from winning more votes even when they spend more are their involvement with scandals or controversies and their health problems.[19] When an incumbent is involved in a scandal,

[15] Jacobson, 'The Effects of Campaign Spending in Congressional Elections'; Jacobson, 'The Effects of Campaign Spending in House Elections'.

[16] Jacobson, 'The Effects of Campaign Spending in Congressional Elections', p. 469.

[17] Ansolabehere and Gerber, 'The Mismeasure of Campaign Spending: Evidence from the 1990 U.S. House Elections'; Green and Krasno, 'Salvation for the Spendthrift Incumbent'; Green and Krasno, 'Rebuttal to Jacobson's "New Evidence for Old Argument" '; Levitt, 'Using Repeat Challengers to Estimate the Effect of Campaign Spending on Election Outcomes in the U.S. House'.

[18] Abramowitz, 'Incumbency, Campaign Spending, and the Decline of Competition in U.S. House Elections'.

[19] Abramowitz, 'Explaining Senate Election Outcomes'; Abramowitz, 'Incumbency, Campaign Spending, and the Decline of Competition in U.S. House Elections'.

his opponent is likely to engage in negative campaigning. Because of this threat, the incumbent spends more but the spendthrift incumbent will fail to garner votes effectively. In short, if we speculate that the OLS estimate for incumbent spending is biased, the search for omitted variables is the correct strategy to avoid biased estimates.[20] In order to avoid omitted variable bias, I employ challenger political experience, negative factors against candidates (scandals, political controversies or health problems), and candidate electoral prospects in the statistical models to be tested in the next section.

Data and Measures

The data used for the test are based on all Senate contests between 1974 and 2000, the period during which candidates' campaign spending data are compiled. In this period, there have been 352 races where incumbents have been contested and where data are available. I measure an incumbent's vote share in terms of the percentage of the two-party vote share that he or she won.

To measure incumbent and challenger spending, I use data compiled by the Federal Election Commission (FEC). In order to control for inflation, I divide the campaign spending by a GDP deflator. This algorithm transforms the current values of campaign spending in various years into a constant value of the base year, 1995. To avoid problems in the few cases with no reported spending, I adopt the convention of adding $5,000 to each candidate's spending.[21] To control for state population, I divide the campaign spending by state population measured in thousands.[22] Finally, I take the logarithm of candidate spending levels measured in real 1995 dollars per capita in a state.

The control variables employed in this study are divided into three groups: (1) candidate factors, (2) state factors, and (3) national factors that are found to be confounded with the relationship between spending and the vote in previous studies.[23]

Candidate Factors

I use the following candidate factors: (i) candidate policy moderation, (ii) challenger political experience, (iii) negative factors against candidates (scandals, political controversies, or health problems), (iv) candidate electoral prospects, (v) incumbent leadership status, and (vi) challenger wealth levels.

I measure candidate policy moderation in terms of the location of a candidate relative to the other candidates who belong to the candidate's party. I subtract the average scores of all incumbents belonging to a given party in a given election year from each candidate's

[20] Abramowitz, 'Incumbency, Campaign Spending, and the Decline of Competition in U.S. House Elections'; Erickson and Palfrey, 'Equilibria in Campaign Spending Games: Theory and Data'.

[21] Green and Krasno, 'Salvation for the Spendthrift Incumbent'.

[22] I use campaign spending per thousand people instead of per capita to restrict the natural logarithm of campaign spending to the range of positive values. This prevents estimated coefficients from being affected too much by the small number of large negative values when the logarithm is taken. Gerber adds the constant 0.01 to real spending per voter before taking the logarithm to avoid large negative values of the logarithms of campaign spending. The qualitative difference in estimated effects is negligible between the two methods.

[23] Gerber, 'Estimating the Effect of Campaign Spending on Senate Election Outcomes Using Instrumental Variables'; Abramowitz, 'Explaining Senate Election Outcomes'; Abramowitz, 'Incumbency, Campaign Spending, and the Decline of Competition in U.S. House Elections'.

NOMINATE score.[24] This procedure transforms the NOMINATE scores into the degree of a candidate's policy conservatism relative to the average of all incumbents belonging to a given party. A higher positive number indicates a more conservative Democrat or Republican. Multiplying 1 to Democrats' scores and -1 to Republicans' scores yields policy moderation scores. The higher a candidate's score is, the more moderate he or she is.[25]

I measure challenger political experience with a four-point scale. I assign 3 to a candidate who had been elected state governor and 2 to a candidate who served previously in the US House of Representatives. I assign 1 to a candidate who had been elected to statewide or local political office (state senator, state legislator, lieutenant governor, state treasurer, auditor, state attorney general, insurance commissioner, mayor or city council). Candidates with no prior experience receive a score of 0. While different scholars use different scales to measure political experience by assigning different weights to different offices, using different measures does not influence significantly the results that I obtain.[26]

Abramowitz used three dummy variables to measure three negative factors against senatorial candidates between 1974 and 1988: scandals, controversies and incumbent's health problems.[27] I adopt Abramowitz's measures for these factors during the period between 1974 and 1988, and I measure the factors during the period between 1990 and 2000 similarly.[28] While Abramowitz uses the factors as three different independent variables, I aggregate them into one variable to make the OLS model parsimonious and to prevent OLS estimates from being affected by the small number of cases judged as negative factors. I add one for the presence of each negative factor.

I use two indicators to represent candidate electoral expectations. First, I use incumbents' vote margins in the previous election. I measure the previous vote margin by the percentage of the two major party vote won by the incumbent senator in the previous election. Next, to capture electoral expectations during campaign processes, I use 'the election outlook' index provided by the *Congressional Quarterly* (CQ).[29] Based on hundreds of expert observations of campaign processes, CQ divides the candidates into seven categories ('Safe Democratic, Democrat Favored, Leans Democratic, No Clear Favorite, Leans Republican, Republican Favored, and Safe Republican'). In order to operationalize CQ's outlook, I assign 7 to candidates who are rated to be safe and 1 to those whose opponents are rated to be safe. I assign the numbers from 2 to 6 for the other categories. A higher number indicates a safer candidate.

Incumbent leadership status in a party would positively affect an incumbent's ability to raise campaign funds. I code 1 for an incumbent with a chairmanship, a ranking membership on a committee or a party leadership position. Other members are coded 0.

[24] Keith T. Poole and Howard Rosenthal, *Congress: A Political-Economic History of Roll Call Voting* (New York: Oxford University Press, 1997).

[25] A simpler measure of candidate policy moderation is to compute a candidate's policy extremism by using the candidate's deviation from the average (or median) senator's policy position. However, this measure does not capture a candidate's extremism relative to the other candidates who belong to the candidate's party.

[26] Gerber, 'Estimating the Effect of Campaign Spending on Senate Election Outcomes Using Instrumental Variables'; Abramowitz, 'Explaining Senate Election Outcomes'.

[27] Abramowitz, 'Explaining Senate Election Outcomes'.

[28] Michael Barone and Grant Ujifusa, *The Almanac of American Politics* (Washington, D.C.: National Journal, 1972–2000).

[29] Congressional Quarterly, *The Congressional Quarterly Weekly Report* (Washington, D.C.: CQ Press, 1972–2000).

To measure challenger wealth levels, I use the *Congressional Quarterly* election preview. I code 0 for a candidate if the candidate's current or former occupation is public or private sector employee, teacher, lawyer, party official and so on. I code 1 for a candidate if he or she is a celebrity, millionaire, real estate developer, business owner, president or top executive of a company and so on.

State Factors

I use the following state factors: (i) state population and (ii) partisan composition in each state. I include state population into the model to test whether it is more difficult for a senator to cultivate personal votes in a larger state. As population size grows, the increase in political diversity makes it more difficult for the incumbent to garner voters through personal contacts. Measuring state population is straightforward. I measure state population in millions.

I measure partisan composition in each state by using the two-party vote share of presidential candidates belonging to the incumbent party. To cancel out idiosyncratic factors that affect presidential vote shares of particular states in particular years, I use the average of vote shares in pairs of presidential elections. When a Senate election was held in midterm, I use the two presidential vote shares before the Senate election. When a Senate election was held during a presidential election, I use presidential vote shares in and before the Senate election.

National Factors

A national factor to be included is presidential coattail effects. According to the divided government thesis, voters tend to split their votes by casting the votes differently between presidential and legislative candidates to maintain the balance of power between the two branches. I use the dummy variable to represent presidential coattail effects by coding 1 if the president and an incumbent share the same party, 0 otherwise. If the divided government thesis holds true, we expect a negative association between the dummy and the incumbent vote.

Statistical Models and Results

In this section, I estimate three statistical models. In the first model, I estimate the effect of candidate spending on incumbent vote shares with the following conventional OLS model. This model estimates the effects of incumbent and challenger spending on incumbent vote shares holding constant their incentives to adjust spending depending on their electoral expectations.

$$\begin{aligned} INCVOT = {} & a + b_1 CHLSPN + b_2 INCSPN + b_3 PRTSAN + b_4 MODERT \\ & + b_5 CHEXPR + b_6 NEGTIV + b_7 PROSPC + b_8 CHWELH \\ & + b_9 LEADER + b_{10} STSIZE + b_{11} COATAL + e \end{aligned} \qquad [A]$$

where *INCVOT* is the incumbent two-party vote share, *CHLSPN* and *INCSPN* are respectively challenger and incumbent spending, *PRTSAN* is state partisan composition, *MODERT* is incumbent policy moderation, *CHEXPR* is challenger political experience,

NEGTIV is negative factors against incumbents, *PROSPC* is the incumbent's election outlook, *CHWELH* is challenger wealth levels, *LEADER* is incumbent leadership status, *STSIZE* is state population in millions, and *COATAL* is presidential coattail effects.

For obvious reasons, I expect that the effect of challenger and incumbent spending on incumbent vote shares is negative and positive respectively. It is straightforward that incumbent previous vote margins and electoral prospects are positively correlated with incumbent vote shares in the current election. The effect of partisan composition is positive since incumbents will win more votes when they have more partisan supporters. I expect that the effect of incumbent policy moderation is positive. I expect that challenger political experiences and negative factors against incumbents have negative effects on incumbent vote shares. I have no expectations concerning the effect of incumbent leadership status and challenger wealth levels since I included these two variables to control for incumbent and challenger spending. I expect the state population to affect incumbent vote shares negatively since it would be more difficult for incumbents to cultivate personal votes. Lastly, I expect that the presidential coattail effect is negative based on the divided government thesis that voters tend to split their votes to maintain the balance of power between the presidency and the legislature.

In the second model, I include the effect of the variables that are derived theoretically from the model. In this model, I am particularly interested in the effects of the interaction between previous vote margins and incumbent spending to analyse how the effects of incumbent spending change according to incumbent previous vote margins. The following equations represent the second model:

$$\begin{aligned} INCVOT = {} & a + b_1 CHLSPN + b_2 CHLSPN \cdot PRVTMG \\ & + b_3 INCSPN + b_4 INCSPN \cdot PRVTMG \\ & + b_5 PRVTMG + b_6 MODERT + b_7 PRTSAN + b_8 CHEXPR \\ & + b_9 NEGTIV + b_{10} PROSPC + b_{11} CHWELH + b_{12}\text{LEADER} \\ & + b_{13} STSIZE + b_{14} COATAL + e, \end{aligned} \qquad [B]$$

where *PRVTMG* is incumbent previous vote margins, *CHLSPN* · *PRVTMG* represents an interaction between challenger spending and incumbent previous vote margins, and *INCSPN* · *PRVTMG* is an interaction between incumbent spending and incumbent previous vote margins.

I anticipate that the effect of the interaction between incumbent spending and previous incumbent vote margins is negative. That is, I expect that as incumbent previous vote margins increase, their spending effect decreases. I have no expectation about the effect of the interaction between challenger spending and incumbent previous vote margins.

Table 1 demonstrates the OLS estimates. First, note that the estimated effect of challenger spending is about 108 per cent greater than that of incumbent spending. Policy moderation by incumbents has a positive significant effect on their votes. Table 1 also shows that incumbent vote shares increase as their partisan vote base increases. Challenger political experience has a significant negative effect on incumbent vote shares whereas incumbent involvement with controversies, scandals and health problems does not. This result is largely explained by its high correlation with candidate electoral prospects. The correlation between incumbent involvement with the negative factors and electoral prospects is -0.309. The coefficient of state population size supports the expectation that it is harder for incumbents to win more votes in larger states. The negative estimate for

TABLE 1 *OLS Estimates Predicting Incumbent Vote Shares in Model A*

Independent variables	Expected sign	Coefficient (s.e.)	Beta (p value)
Challenger Spending	−	− 2.758**** (0.247)	− 0.505 (0.000)
Incumbent Spending	+	1.327*** (0.484)	0.119 (0.006)
Incumbent Policy Moderation	+	3.087** (1.195)	0.090 (0.010)
State Partisan Composition	+	17.413**** (4.517)	0.147 (0.000)
Challenger Experience	−	− 0.851** (0.424)	− 0.073 (0.046)
Negative Factors	−	− 1.235 (1.196)	− 0.034 (0.303)
Electoral Prospects	+	2.661**** (0.321)	0.342 (0.000)
Challenger Wealth Levels	·	1.735 (1.602)	0.036 (0.280)
Incumbent Leadership	·	− 1.398** (0.668)	− 0.069 (0.037)
State Population Size	−	− 0.215*** (0.070)	− 0.115 (0.002)
Coattail Effect	−	− 3.150**** (0.743)	− 0.156 (0.000)
N		356	
R^2 (adjusted R^2)		0.658 (0.647)	
F-ratio		60.217 ****	

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$, ****$p < 0.001$ (two-tailed).

the coattail effect indicates that a significant number of voters split their votes between senate elections and presidential elections.

The effect of incumbent spending estimated in Table 1 shows that incumbent spending is less effective than challenger spending when marginal and safe incumbents are aggregated. However, the disaggregation of incumbents into marginal and safe incumbents reveals that the efficiency in incumbent spending significantly differs between the marginal and safe seats.[30] Table 2 demonstrates the effect of incumbent and challenger spending as

[30] The conventional standard that distinguishes marginal seats from safe seats is 60 per cent, but incumbent electoral security since the 1970s has decreased, and Jacobson suggests that incumbents became less safe even with vote share of 65 per cent in the House elections. I use 65 per cent to distinguish marginal seats from safe seats based on Jacobson's argument (Gary C. Jacobson, *The Politics of Congressional Election*, 4th edn (New York: Longman, 1997)).

TABLE 2 *OLS Estimates Predicting Incumbent Vote Shares in Model B*

Independent variables	Expected sign	Coefficient (s.e.)	Beta (p value)
Challenger Spending	−	− 2.809**** (0.390)	− 0.511 (0.000)
Challenger Spending × Previous Vote Margins	·	0.003 (0.012)	0.024 (0.813)
Incumbent Spending	+	2.876**** (0.708)	0.259 (0.000)
Incumbent Spending × Previous Vote Margins	−	− 0.062*** (0.023)	− 0.684 (0.007)
Previous Vote Margins	+	0.446*** (0.133)	0.737 (0.001)
Incumbent Policy Moderation	+	2.706** (1.179)	0.079 (0.022)
State Partisan Composition	+	17.924**** (4.459)	0.152 (0.000)
Challenger Experience	−	− 0.825** (0.417)	− 0.071 (0.049)
Negative Factors	−	− 1.064 (1.172)	− 0.030 (0.365)
Electoral Prospects	+	2.617**** (0.327)	0.337 (0.000)
Challenger Wealth Levels	·	1.717 (1.569)	0.035 (0.275)
Incumbent Leadership	·	− 1.708** (0.665)	− 0.084 (0.011)
State Population Size	−	− 0.156** (0.070)	− 0.083 (0.027)
Coattail Effect	−	− 2.974**** (0.735)	− 0.147 (0.000)
N		353	
R^2 (adjusted R^2)		0.676 (0.663)	
F-ratio		50.444****	

a function of incumbent previous vote margins.[31] The interaction terms represent the change in the effects of incumbent and challenger spending when incumbent previous vote margins change. The estimates from Model B show that incumbent spending is more effective than challenger spending when the incumbent previous vote margin is 0 per cent (when incumbents won 50 per cent in the previous election). As the incumbent previous vote margin increases, the effect of incumbent spending decreases. For example, when

[31] Since I used logged measures of incumbent and challenger campaign spending, the marginal effect of candidate spending is diminishing.

incumbent previous vote margins are respectively 10 per cent and 20 per cent, the effects of incumbent spending are 2.256 ($2.876 - 10 \times 0.062$) and 1.636 ($2.876 - 20 \times 0.062$). The effect of the interaction between and incumbent spending and incumbent previous vote margins is significant at the 0.01 level. In contrast, the effect of challenger spending does not significantly change according to incumbent previous vote margins.

CONCLUSION

This article offers a theory that explains why incumbent spending is less effective than challenger spending. I have argued that incumbent spending efficiency depends on the marginality of seats: safe incumbent spending is less effective than marginal incumbent spending since safe incumbents have to buy fewer extreme voters whereas marginal incumbents can easily buy a larger number of swing voters. The analysis of the Senate election between 1974 and 2000 supports the expectation that safe incumbent spending is less effective than marginal incumbent spending. In addition, the analysis reveals that marginal incumbent spending is more effective than challenger spending in competitive elections. The previous findings of less incumbent spending reflect the fact that incumbent spending is estimated without analysing the interaction effect between incumbent spending and marginality of seats. When I analyse the change in incumbent spending as a function of incumbent previous vote margins, incumbents who won less than 60 per cent of the two-party vote in previous elections were able to buy votes more effectively than challengers.

The finding in this article suggests a policy recommendation that is different from Jacobson's recommendation to increase public financing to boost challengers' competitiveness. Results from this article suggest that an increase in public financing is more likely to help incumbents in competitive elections. Although such an increase would help challengers against safe incumbents, it is less likely that challengers can defeat safe incumbents than marginal incumbents. Between 1974 and 2000, challengers were able to defeat only about 8 per cent of safe incumbents. Thus, we should expect that an increase in public financing would affect electoral competitiveness negatively.

Lastly, I discuss a direction for further research. In this article, I simply assume that the effect of candidates' campaign spending will be distributed evenly to all constituents. However, in a future study it would be useful to analyse the situation in which candidates distribute resources unevenly across voters according to their ideological positions. Ward offers a game theoretical model in which a central party allocates resources across different constituencies according to probability of winning the constituencies. He finds a counter-intuitive result that refutes non-game theoretical wisdom that parties focus their campaign resources on marginal constituencies. Ward's model shows that it is not rational for a less endowed party to distribute resources to marginal constituencies since a more endowed party can always overspend in those constituencies. Ward instead finds the less endowed party spends their resources to capture constituencies sequentially starting from those nearest to the one with a half chance of winning and moving on to constituencies that are harder to capture. Ward's resource distribution game at the national level offers a useful framework for analysing a campaign spending game at the district level.[32]

[32] Hugh Ward, 'The Glass Bead Game: Testing Game-Theoretic Models of Politics', in Elinor Scarbrough and Eric Tanenbaum, eds, *Research Strategies in the Social Sciences: A Guide to New Approaches* (Oxford: Oxford University Press, 1998), pp. 217–48.

APPENDIX

Proof of Results I and II

Differentiating $\vec{\theta}$ with respect to r_L, we get $\frac{\partial \vec{\theta}}{\partial r_L} = \frac{c + r_R - 2x_L + x_L^2 + 2x_R - x_R^2}{(r_L + r_R + 2x_R - 2x_L)^2}$.

If $-2x_L + x_L^2 + 2x_R - x_R^2 > 0$, $\frac{\partial \hat{\theta}}{\partial r_L} > 0$ since $c + r_R \geq 0$.

Solving $-2x_L + x_L^2 + 2x_R - x_R^2 > 0$ for x_L, we get $x_L < 2 - x_R$ and $x_L < x_R$.

Since $0 \leq x_R \leq 1$ and $x_L < x_R$ by assumption, it must be that $x_L < 2 - x_R$.

Therefore, $-2x_L + x_L^2 + 2x_R - x_R^2 > 0$, which implies $\frac{\partial \hat{\theta}}{\partial r_L} > 0$.

Differentiating $\vec{\theta}$ twice with respect to r_L, we get $\frac{\partial^2 \vec{\theta}}{(\partial r_L)^2} = \frac{-2(c + r_R - 2x_L + x_L^2 + 2x_R - x_R^2)}{(r_L + r_R + 2x_R - 2x_L)^3}$.

The nominator is negative since $c + r_R \geq 0$ and $-2x_L + x_L^2 + 2x_R - x_R^2 > 0$.

The denominator is positive since $x_L < x_R$. Therefore, $\frac{\partial^2 \hat{\theta}}{(\partial r_L)^2} < 0$.