

The Economics of Election Campaign Spending Limits *

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Abstract

Spending limits are an important rule in the electoral game. Critics of limits claim that incumbents write these rules to keep down promising challengers. Their arguments are seductive but do not stand on a firm empirical base. The data seem quite eager to support or reject the critics' view, given the proper massaging. This paper suggests that if incumbents profit from spending limits, they will take their profit in a way that leaves no trace in the data. Profit does not come in the form of higher votes for the incumbent, but as richer government spoils for their close supporters. This explanation goes against the traditional view of how limits help incumbents. The explanation also helps to explain why there may never be a winner in the empirical debate on whether incumbents or challengers profit from limits.

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Introduction

Campaign spending limits are a frustrating topic in the study of elections. Since Palda (1973) launched the study of the effect that political advertising can have on success at the polls, researchers have hammered each other with statistics that reject or support the case for regulating election outlays. Their rivalry is constant because it rests on a simple, unchanging story. Between elections the incumbent is busy making a name. By the time of the campaign, money buys the incumbent little recognition. The challenger starts the race unknown and needs every dollar to win support. In technical terms, the incumbent's marginal product of campaign spending is lower than the challenger's marginal product. This means that a campaign spending limit will hurt the challenger and help the incumbent. Researchers agree on the broad lines of the story but differ on whether challengers get the most bang per buck. Jacobson [1978, 1985, 1990] finds that incumbents get no votes for their money. Green and Krasno [1988] find that incumbents get almost as many votes from their campaign outlays as challengers. If Jacobson is right, why do incumbents bother to raise money? If Green and Krasno are right, why are incumbents the prime movers for a style of campaign finance reform that could only seem to harm them? The academic rivalry might cool with the answer to a simple, but neglected question: is money all there is to the election campaign?

In this paper I suggest that the key to the debate on spending limits lies in the platforms candidates are able to choose. A shift in platforms may hide from researchers the true vote-getting power of money. An incumbent who is well-funded and expects to win by a wide margin, may decide to shift his platform. Instead of riding to a strong victory on his campaign spending, he can choose a platform that favors well-organized special interest groups. These groups may reward the incumbent with material gifts the majority is not organized enough to give. By trading votes for favors the incumbent will make it hard for researchers to discover how productive his campaign spending is. He spends, wins votes, but loses these votes in return for special interest group favors. To a researcher, the incumbent's shifting platform will hide the fact that money, holding all else constant, could win votes for the incumbent. The problem for researchers is that "all else" is not held constant. As the incumbent spends more in the foreground, he will be shifting his platform in the background. This effect is likely to hold only for incumbents. Challengers worry about winning. They have no margin

of victory to trade against special interest favors. With challengers, researchers can be more confident about finding the true effect of campaign spending on votes than with incumbents.¹

Recognizing that incumbents may give up popular support for personal riches changes the way we look at laws that limit campaign spending. If incumbents truly have lower marginal products of spending than challengers, researchers would predict that a limit that binds all candidates will lead to incumbents winning by wider margins of victory than they did before limits. The conjecture of this paper is that spending limits will not show up as a change in the vote counts of candidates, but rather will help incumbents enrich themselves at the expense of the majority. Incumbents will give up the lead the limits could give them by ruling in a way that favors special interests and loses incumbents some of their popular support.

If incumbents trade popular support for personal riches, then students of elections will have to look at the data in a new fashion. We may never be able to find out whether incumbents have lower marginal products than challengers. If we find these lower marginal products we may be surprised to find that after a limit is imposed, incumbents do not do any better at the polls than before the limit. They may instead be doing better on the hidden margin of personal enrichment, a margin beyond our ability to measure.

1. The Traditional Story About Limits

Two common findings are at the heart an academic "folk tale" about spending limits. Jacobson set the scene in 1978 (and later in his work for the groundbreaking *Campaign Finance Study Group* of 1979). His analysis suggested that in 1974 House elections, challengers gained on average 12.1% of the vote for every \$10,000 they spent, where incumbents gained only 2.8% of the vote for every \$10,000 spent. Palda and Palda [1985] added to the excitement with their finding that in Canadian elections, being a first term incumbent in

¹Congleton (1989) has tried to mix campaign spending into a model of candidate platforms, but his approach takes a different tack from mine. He believes that there is a tradeoff between the vote maximizing platform the candidate can choose and the contribution maximizing platform. The candidate is in a bind because he cannot adopt the vote maximizing platform without money to advertise his views. So he must compromise and deviate from this platform to get the money he needs to win office. Congleton however does not consider the possibility that candidates trade votes off against personal riches.

Canadian parliamentary elections was worth an extra 8,1000 (in districts of roughly 50,000 constituents). These two clues are the first step toward understanding who might benefit from spending limits. Bender [1988], Jacobson [1978], and Lott [1989] reason that incumbents use franked mailing rights, paid travel, and government office staff to promote themselves while in office. This assures them a large block of initial voter support but leaves little to accomplish for incumbent campaign spending. Challenger spending is a threat to incumbents because challengers have not spent into the range where their money loses its power. A limit could protect the initial vote advantage of incumbents while saving them the expense of a pitched battle for election.

"Could" is the operational word in this script. Caution must be exercised before concluding that limits always hurt challengers. The ability to raise money, and the level of limits, can change the story. To illustrate, suppose that the incumbent can raise \$100,000, and receives one vote per dollar, all else constant. The challenger can raise \$75,000 and receives two votes per dollar. A \$50,000 ceiling is imposed. In this case the ceiling does not affect the chances of either candidate. The incumbent suffers twice the loss in money raising power but that money is only half as potent in his hands as in the challenger's hands. The incumbent would be glad with the \$50,000 ceiling because he could preserve his chances of winning and avoid the headache of raising \$100,000 to the challenger's \$75,000.

Figure 1 gives more detail. The figure should be read from left to right, as we imagine a limit starting at \$100,000 (point A) that sweeps left towards zero. Between \$100,000 and \$75,000 (point B) the limit hurts the incumbent. We have to conclude this because before any limit was imposed the incumbent was able to choose this range, but declined. Between \$75,000 and \$50,000 is a gray area. Here the limit has begun to bind the challenger. In this zone the incumbent's drop in votes is no worse than in the earlier zone, but his expenses are smaller. He might be enticed to vote for a spending limit that lessens his chances of winning provided the savings in money raising toil were large enough. Any limit below \$50,000 (point C) dominates all higher limits in the incumbent's view: his chances of winning are higher than in the unregulated state, and his expenses are lower. The ideal ceiling would be one of no campaign spending (point D), such as seem to exist in Japan, and such as come close to existing in Great Britain at the constituency level. Note that even without limits the incumbent might expect to win. But the limit can make the win more certain and less

painful than it would be in a free contest of cash.

Another way to show the gain incumbents may get from lowering the limit comes from considering the function that could determine a candidate's probability of winning:

$$P_I(S_I, S_C) = \frac{S_I + S_I}{S_I + S_I + S_C} \quad (1)$$

The incumbent's probability of winning is P_I . It rises as incumbent spending S_I rises and falls as challenger spending S_C rises. The main thing to notice about this equation is the term S_I which stands for the incumbent's initial advantage. This term is the campaign dollar value of franked mailing, government-paid research staff, and of other advantages that come with elected office. It is fixed for the length of the race. What benefit does the incumbent get from lowering the spending ceiling? This depends on his or her objective. The candidate may wish to gain office to control a government jackpot of resources worth J dollars. The cost of campaigning may be some function of how much money the candidate raises. As Hubert Humphrey put it, money raising is a "dirty, disgusting, demeaning business." Candidates of Humphrey's mind might wish to raise a little less money than they can, even this means accepting a lower chance of winning the jackpot. As Baron [1989], Palda [1989, 1992], and Morton and Cameron 1992, have suggested, the incumbent may accomplish this by maximizing a function of the following sort:

$$U = P_I(S_I, S_C)J - S_I \quad (2)$$

Where PJ is the jackpot the candidate expects, and S_I is both the contribution he accepts and the value of favors he must pay back to his contributors. Under a ceiling S that binds both candidates, the incumbent's objective would be to vary the ceiling to maximize:

$$U = \left[\frac{S + S_I}{2S + S_I} \right] \times J - S \quad (3)$$

The derivative of this function with respect to the binding ceiling S is negative for all values of S . Lowering the ceiling increases the incumbent's expected jackpot, and lowers his or her costs of campaigning. The optimum is a corner solution with a ceiling of zero. It can also be shown that the larger the incumbent's initial advantage S the more he benefits from any

lowering of the ceiling.² These results hold whether incumbents maximize some sophisticated objective such as expected surplus or whether they just care about winning (maximizing P).

Sensitive students of the theory of campaign contributions might quail at such an exercise. The probability function only shows the increasing benefits of lowering the limit once a limit that binds both candidates is reached. This chain of reasoning cannot say anything about whether incumbents want a limit in the first place because the reasoning only considers incumbent welfare after a ceiling has been set on spending. What is missing is a complete model of the demand for and supply of campaign contributions---the Holy Grail in the theoretical study of campaign finance. The lack of such a model shows up more clearly in Figure 1. What is to say that the lines should be drawn straight? As a limit grips the incumbent at the \$100,000 level (point A) the challenger's ability to raise money will grow and the incumbent's ability will recede, making a muddle of the linear progress of our story from point A to point D. And what is to say that the marginal products of both candidates are constant?

These are good critiques. But they do not make nonsense of the limits story. Even though Figure 1 and the probability function demonstration gallop blindly past profound questions of political equilibrium, they carry us in the right direction: incumbents *may* want a limit if they are not too far ahead of challengers in their ability to raise money. Once they decide they want a limit, they will want to push it to the lowest possible level.

If incumbents are supposed to be so keen on limits, why do we seldom see all incumbents agreeing to curb campaign spending? Why are spending ceilings seldom set to zero? More precisely:

1. *Why should a minority party favor a limit? If limits preserve individual seats they will also preserve majorities of seats. Minority parties who favor limits will freeze themselves out of power.* A possible answer is that limits may protect incumbents of all parties from the dark horse challenger. This challenger will appear at random and strike fear into the hearts of minority and majority party incumbents with equal frequency. A limit may protect all incumbents from this threat, but have no effect on the types of national

²When S is large, the incumbent's marginal product is small. He gets a small bang per campaign buck. This makes a ceiling interesting for him.

shifts in opinion that touch every district and unseat a ruling party. This means that limits would not freeze minority parties out of power, they would only freeze one-off talented candidates out of their chance at office. To resort to jargon, limits are insurance against the idiosyncratic risk posed by the threat of abnormally potent challengers. If this threat is independently distributed across districts, removing the threat to particular incumbents will have little effect on the final seat counts of their parties. This argument can be made more precise with the help of the probability function discussed earlier. Suppose that an incumbent's chance of winning is as follows:

$$P_I(S_I, S_C) = \frac{S_I + S_I}{S_I + S_I + \epsilon S_C} + \gamma I_{REP} + \delta I_{DEM} \quad (4)$$

Here ϵ is a random variable. A high value of ϵ is bad luck for the incumbent. Fate has dealt him or her a challenger of high quality. Idiosyncratic risk has put the incumbent in a pickle. The random terms γ and δ are party risk and I_{REP} , I_{DEM} are indicator functions taking on the value of 1 if the candidate in question belongs to the party (Republican or Democrat) indexed by the function, and zero otherwise. These party risk random terms represent a national mood swing that hits all candidates in a particular party, challengers and incumbents alike. The way the equation is set up money can do nothing directly to stop this effect.

How do limits change the balance of power in the legislature? An answer that is both right and wrong, is that *limits have no effect on the balance of power*. Table 1 helps to make this point: In this Table, Republicans control the legislature with 20 seats. Democrats have 10 seats. Each incumbent of both parties has a 70% chance of winning. Table 1 suggests that over time the parties will converge to an equal number of seats. A limit that raised the probability of incumbent victory to 90% would not change the situation. The Republican party would still lose seats. After the 1994 election it would have 19 seats to the Democrats' 11. The difference between this and the unregulated case is that the Republican's slide to equality with the Democrats is slower under a limit. Figure 2 shows the rate of decay of a party's seats with and without limits. This Figure also shows what happens when the electorate feels a shock of delight at the thought of voting Republican (a high value of γ). Incumbent Republicans gain seats, but their gain does not last forever. In the end limits do not change the fact that a dominant

party will lose power. Limits put the loss of power off to the future. They "dampen" the effects of country-wide shifts in opinion on the change in a party's number of seats. This dampening is what some call electoral inertia.

Incumbents from the challenging party might not mind a system of limits that builds inertia into electoral majorities and minorities, provided the inertia is not too large. These incumbents will weigh the value of being safe in their seats against the frustration of being in a minority party. This explains why incumbents from all parties may be in favor of a limit. They may not all agree on the proper height a spending ceiling should take, but the principle of a ceiling will not offend them.

Incumbents from the challenging party need not be too frustrated about a limit's effects on their party's inertia when random shocks are idiosyncratic. It is in the nature of dark horse candidates to strike incumbents from both parties with equal frequency. Even before limits, dark horses do not have much effect on the balance of power. Leaders of the challenging party are less keen about limits when random shocks strike a party. In deciding whether to support the ruling party's proposals for limits, leaders of the challenging party must weigh the undesirable consequences of inertia against the joys of personal political security.

There is anecdotal evidence that incumbents of major parties close ranks in the face of idiosyncratic risk, and that ending this risk may be worth building inertia in elections. In the last ten years, this risk has worn the face of the public interest group ("P.I.G.s" as Murray Weidenbaum has described them). In the US these groups worry the two major parties because they are unpredictable. Independent groups even distress candidates on whose behalf they advertise. As a former Congressional campaign manager said "Independent expenditure scares the daylights out of me. A third party comes in that doesn't know my strategy or my budget and interjects itself. This could terribly jeopardize a campaign" (Sabato 1985, pp. 102-3). A congressional aid referred to independent campaigns as "loose cannons on deck." To tie down these loose cannons, Congress has tried since 1974 to pass laws that limit how much private citizens or groups can spend on election advertising. Canadian Members of Parliament have shown the same need to filter out random dangers to their tenure. In 1993, Canada's three

major parties took less than an hour to unanimously pass a law limiting private groups to \$1000 of campaign advertising. As Paltiel showed in a series of studies [1979, 1980, 1981, 1988] Canadian and American incumbents are following in a European tradition of keeping outsiders on the outside.

2. *Why, if limits are so good for incumbents do we not see limits of zero set in all countries with free elections?* The answer hinges again on the balance incumbents must strike between individual interest and party interest. We can see this by continuing with the example of the Republican party that holds 20 seats in the legislature to the challenging party's 10 seats. If Republican incumbents are all alike, and Republican challengers are all alike, the expected number of Republican seats is:

$$E(SEATS^{REP}) = \sum_{i=1}^{20} P_{I,i}^{REP}(S_{I,i}^{REP}, S_{C,i}^{DEM}) + \sum_{i=1}^{10} P_{I,i}^{REP}(S_{C,i}^{REP}, S_{I,i}^{DEM}) \quad (5)$$

This expression is unpleasant to look at, but is really saying something simple. It says that the seats the Republican party can expect to win is the sum of the probabilities ($P_{I,i}^{REP}$) of each one of its incumbents i winning and the sum of the probabilities of each one of its challengers I winning ($P_{C,i}^{REP}$). The change in the number of expected seats that comes from lowering a binding ceiling s is:

$$\underbrace{\sum_{i=1}^{20} \frac{dP_{I,i}^{REP}}{dS}}_{<0} + \underbrace{\sum_{i=1}^{10} \frac{dP_{C,i}^{REP}}{dS}}_{>0} \quad (6)$$

The first expression says that lowering a ceiling will help individual Republican incumbents and tend to increase the number of Republican seats. The second expression says that a low ceiling will hurt Republican challengers and tend to reduce Republican seats. If challengers of all parties are identical and incumbents of all parties are identical, then the incumbent party can only gain seats by raising the limit.³ Only if Republican challengers face Democratic incumbents who on average have a larger initial advantage S than Republican incumbents, will the Republican party have an incentive to hold

³"Identical" here means that all incumbents share the same function that guides their probability of winning P and have the same campaign spending. Identical challengers resemble themselves in the same fashion. If all challengers are alike in this sense, and all incumbents are alike then the expected change in the Republican

back from setting zero limits. In such a case the Republican party might lose seats from imposing a zero limit. The limit could help Democratic incumbents more than it helps Republican incumbents because democrats have spent further into the zone of diminishing returns (this proposition is straightforward to prove).

These two points show that there is tension between the individual incumbent's interests and those of his or her party. This tension divides incumbents when it comes to voting for a limit, and holds back enthusiastic incumbents from voting for a complete ban on campaign spending.

2. Platforms and Money: A Model

The story I have just told about why incumbents may want to impose spending limits is easy to understand and seems to fit some important facts about money in elections. The story is also incomplete. Empirical studies have not settled the question of whether incumbents have a lower marginal product of spending than challengers. The lower incumbent marginal product is a pillar of the traditional story. If one day the data speak with a single voice that declares the marginal products of all candidates equal, does this mean that incumbents have been wronged by their academic critics? Does this mean that instead of looking for some sinister motive behind spending ceilings, we should instead acknowledge that legislatures write such laws in a spirit of public service?

In this section I suggest that the traditional story is headed in the right direction. The problem though, is that the traditional data may never be able to confirm this point. Incumbents party's seats from lowering a limit would be:

$$\frac{dE(SEATS^{REP})}{dS} = 20 \frac{dP_I^{REP}}{dS} + 10 \frac{dP_C^{REP}}{dS} \quad (7)$$

Noting that $P_C = 1 - P_I$ suggests that we can convert the above equation to

$$20 \frac{dP_I^{REP}}{dS} + 10 \left(1 - \frac{dP_I^{REP}}{dS} \right) = 10 \left(1 + \frac{dP_I^{REP}}{dS} \right) \quad (8)$$

This term will always increase as S decreases, meaning that the Republican party will always gain seats from a falling ceiling, if my rigid assumptions about the similarity of incumbents and the similarity of challengers, holds.

may vary their platforms to gain or *lose* general voter support. Pushed to its extreme, this thought can lead to the conclusion that campaign money will have no visible effect on votes at the margin, for either challenger or incumbent. Candidates may instead wish to translate the support they can win by spending money into policies that lose them votes but favor special interest group supporters.

The candidate who tries to be loved by many people is not a happy candidate. He has little room to indulge in policies that suit his fancy. He cannot satisfy friendly special interests at the expense of the majority. Handing out special favors would lose him the love of the masses. What if suddenly he were given some special advantage over his opponent that gave him a lead in the polls (such as government paid mailings during the years between elections)? Would he ride to victory on this head-start? He might. Or he might decide to push his luck. He could favor his hangers-on with special favors. By skewing his platform to favor special interests he would lose some of the lead that came with his special advantage. What would he do with an unexpected campaign contribution? He would spend it to raise his votes, build support, and then he would choose a policy that favors his faction and loses him nearly all the support the campaign contribution won him.

To a researcher it would appear as if campaign spending had no effect at the margin. The apparent impotence of money would hide that the money has allowed the candidate to promise special favors to his followers. If such hidden forces are at play, campaign spending limits will also work in hidden fashions. If spending limits allow incumbents to protect their lead, they may wish to lose this lead in order to favor their friends. The limit will not change the final tally of votes between challenger and incumbent. Instead, the limit will change the final distribution of government favors across the electorate.

To get to these conclusions it helps to have an idea of how money works on the minds of voters. Two effects should be at work: how effectively money reaches the voter, and the message that money delivers. It is usually the first effect that researchers have in mind when they set out to measure the effect of money on votes. But the second effect---the platform---may be just as important a determinant of the productivity of campaign spending. This means that the way voters filter information and the information candidates choose to send out are at the heart of the votes production function. To understand this production function we must look in detail at how voters make up their minds and how candidates set

their platforms.

Voters

Let us start by looking at voters, since they are the basis for candidate actions. The first thing a voter asks himself or herself is, "From which candidate can I expect the greatest satisfaction?" Satisfaction can mean many things but to keep the story simple it helps to speak of a single index that feeds satisfaction. How much more income a voter has under one candidate is a possible choice for such an index. The reader who finds this too simplistic a view will, on reading further, learn that my choice of an index is incidental to the picture of the voter I am building up.

The incumbent may promise a particular citizen the following change in income: Y_I . The citizen will believe this promise and not believe it at the same time. As Wittman [1989] argues, on average candidates tell the truth. Political competition weeds out persistent liars, or candidates who cannot deliver on their promises. The problem from the voter's point of view is that hidden forces beyond the candidate's control will drive a wedge between what is promised and what is delivered. The economy may dip in the years during which the incumbent had promised more government spending. This dip ties the incumbent's hands and does not allow him to deliver entirely on his promises. Other hidden forces, described in the economics literature as "principal-agent" problems, make it impossible for voters to monitor their leaders as they would wish. Sometimes voters will be blessed with unexpectedly good agents. At other times the agents will be unexpectedly bad. This means the income after the election that the voter realizes under the incumbent, $Y_I^{realized}$ will look something like this:

$$Y_I^{realized} = Y_I + \epsilon_I \quad (9)$$

Here ϵ_I stands for the hidden forces the voter must guess at if he wants to form some impression of the range, or "distribution" of possible realized incomes $Y_I^{realized}$ (Bernhardt and Ingberman [1985] had a functional form like this in mind in their general treatment of races between incumbents and challengers).

The voter's problem is that he or she can never tell precisely what part of realized income is thanks to the incumbent, and what part is the work of chance. At least in a competitive system the voter can expect that on average his guesses will be right. No one will be able to

trick him time after time. Put differently, the voter's expectations (denoted by the operator $E[\dots]$) are unbiased in the sense that:

$$E[Y_I^{realized}] = Y_I \quad (10)$$

And ϵ is the same for all voters. It is normally distributed with mean zero and standard deviation σ_I . This is a formal way of saying that the candidate tells the truth on average and that the voter is aware of the candidate's honesty. This reflects the fact that the political market is competitive. Persistent liars are recognized and weeded out.

A voter will vote for the incumbent if his expected utility, $E[u]$, under the incumbent is greater than that under the challenger. In other words if

$$\dot{E}_{I,C} = E[u(Y_I^{realized})] - E[u(Y_I^{realized})] > 0 \quad (11)$$

Once again, the assumption is not innocent. It says that a voter will choose the candidate who is best for him even if that voter does not believe his ballot can make a difference (be instrumental) to the election outcome. Readers who believe that voters participate in elections for instrumental reasons will wonder where I have hidden the term which shows the probability that the voter in question will cast the decisive vote. Others who follow Coleman's (1990) notion that people vote to obey societal norms will be less bothered by the omission of such a term. I have not included it because I believe it is not central to the analysis, and because debate on this topic is far from reaching a consensus. Chamberlain and Rothschild (1981) believe the probability of being decisive to be very small for communities of more than a thousand people. Ledyard (1984), who takes a game-theoretic approach to participation, believes it can be large even in large communities.

Expanding both expected utilities in a second-order Taylor series gives: ⁴

$$\dot{E}_{I,C} = u(Y_I) - u(Y_C) + \frac{1}{2}[\sigma_I^2 u''(Y_I) - \sigma_C^2 u''(Y_C)] \quad (14)$$

Let us try to understand this expression by joining a voter during the middle of an election campaign and asking him a few questions. Suppose this voter tells you that he wants to vote for the incumbent even though he thinks his income would be higher under the challenger. At first this voter appears irrational. If he had a grasp of technical jargon he could reverse our impression. He would explain that he has unbiased expectations ($E[Y(\text{realized})_I] = Y_I$), and believes that on average his income would be higher under the challenger, so that $u(Y_I) - u(Y_C) < 0$. The problem is that he believes the challenger could either be a great success in office or a great disaster. That is, σ_C is very "large".⁵ Later in the campaign, after seeing some advertisements by the challenger our voter changes his mind. The advertisements simply confirm his expectation that $u(Y_I) < U(Y_C)$ and in the appropriate jargon, he explains that campaign advertisements have reduced the variance of perceived future challenger performance to the point where his $\dot{E}_{I,C}$ has become negative. Once the voter's $\dot{E}_{I,C}$ has flipped from positive to negative, he has crossed what has come in the literature to be called a Downsian threshold, and decides to vote for the challenger.⁶

In this model then, campaign spending reduces the variance of a candidate's perceived

⁴This expression comes from recognizing that the second-order Taylor-series expansion of expected utility from, say, incumbent victory, is:

$$E[u(Y_I^{\text{realized}})] = E[u(Y_I) + \epsilon u'(Y_I) + \frac{1}{2} \epsilon^2 u''(Y_I)] \quad (12)$$

$$\approx u(Y_I) + \frac{1}{2} \sigma_I^2 u''(Y_I) \quad (13)$$

The normally distributed error means that we can ignore third-order and higher-order terms of the Taylor expansion. The normal distribution has no moments beyond the second moment.

⁵This statement can be made more precise. If the voter favors the incumbent even though $u(Y_I) < u(Y_C)$ then it must be that the second expression in the $\dot{E}_{I,C}$ equation is positive enough to outweigh this difference. Note that $\sigma_I^2 u''(Y_I) < 0$ and $-\sigma_C^2 u''(Y_C) > 0$. And because of diminishing marginal utility, $u''(Y_I) > u''(Y_C)$. This means that σ_C^2 must be so large that when multiplied by its relatively smaller second-derivative of utility, its negative effect still outweighs all other positive effects.

⁶Noll [1993] has recently presented an excellent formal model of this threshold that is more general, but less operational than the one I present here.

performance. Advertising may reduce variance by forcing the candidate to commit to a well-defined platform. This would give him less principal-agent slack to exploit.

By advertising, a candidate might change not only his variance, but that of his rival:

$$\sigma_I = \sigma_I(S_I, S_C) \quad (15)$$

$$\sigma_C = \sigma_C(S_C, S_I) \quad (16)$$

where (S_I, S_C) are campaign spending by incumbent and challenger. Now we can see how campaign spending will work to change a voter's mind. The effect of increased challenger spending on voter i 's inclination to vote for the incumbent will be:

$$\frac{\partial \dot{E}_{I,C}}{\partial S_C} = \frac{\partial \sigma_I}{\partial S_C} u''(Y_I) - \frac{\partial \sigma_C}{\partial S_C} u''(Y_C) \quad (17)$$

The above equation suggests that there are several ways in which a candidate can increase his popularity with voters. He can reduce uncertainty about himself or he can try to increase uncertainty about his rival. Holding platforms constant, a candidate can always benefit from clarifying his platform, even if that platform is disliked by a majority of voters.⁷ He can also always benefit from sowing uncertainty about his rival, even if his rival has an unpopular platform.

I want to caution that this is by no means the only way of modeling the effect of spending on the voter's knowledge. It is possible that voters also are uncertain of their estimate of candidate variances (σ_I, σ_C) . Spending may clarify what this variance is and reveal that it was larger than the voter thought. If this sort of effect was at work, campaign spending would tend to reduce voter support for the candidate. The particular "information structure" I have chosen can be disputed on these grounds. The skeptical reader however is encouraged to substitute his own information structure. He will discover that it has little bearing on the point I am trying to make in this paper.

The above equation is the basis for understanding a candidate's marginal product of campaign spending (the Appendix goes into more detail). The equation shows how close a

⁷For example, if the candidate is an incumbent and most voters perceive $u(Y_I)$ as being less than $u(Y_C)$, the incumbent can still gain votes by reducing the variance of his position. He may be so good at reducing variance even people who do not like him---in the sense that $u(Y_I) < u(Y_C)$ ---vote for him.

particular voter is to the threshold of changing his mind about a candidate. When a candidate spends money he will lead some voters over this threshold. How many he leads for each dollar he spends is his marginal product of campaign spending on votes. A candidate who is not known might be able to lower this variance quite significantly with a few advertisements that spell out some basic facts "Am I am man or a woman? What is my ethnic background? What experience can I bring to the job?" Candidates who are well know may have a hard time bringing this variance down.

The incumbent who has already used the resources of government to promote himself and reduce uncertainty about his platform may find that the effect of further campaign spending on his variance is small. This does not necessarily mean the marginal product of his spending on votes is small. Where he sets his platform will affect how many people are poised to cross the threshold of decision and come over to the incumbent. In other words, the statistical distribution of voter's thresholds will have a bearing on the incumbent's marginal product. This distribution will be determined in part by variations in the parameters of voter utility functions, but also by variations in the income changes that the incumbent promises.

This is the crucial point to understand about marginal products. They are not a mechanical relation between inputs of money and outputs of votes, but a fluid quantity that incumbents and challengers can influence by their political policies. In this light the traditional story about how spending limits help in incumbents needs to be revised. To see how this revision must go, we need to consider the behavior of candidates more closely.

Candidates

Now that we have a sense of the mechanics of platforms and votes, we can ask what platform a candidate will choose. The platform he chooses depends on his goals. Does he want a large majority of votes, or is he looking for something else? "Something else" might be special interest favors that the candidate "buys" by announcing a platform that does not raise him to the heights of popularity. What are the mechanics of such a tradeoff and who is best suited to playing this sort of game?

The game in question is one of taking money from some groups in society and enriching others. This is in large part what candidate platforms do. The state provides public

goods, but there is remarkable agreement between the parties on the need for these goods. Disagreements between parties generally center on policies that help some groups at the expense of others. Most economic regulation serves to protect industries. Seventy percent of government spending is on transfer payments. It is this sort of divisive activity I am thinking of when I speak about candidates setting their platforms.

The analysis developed so far suggests that incumbents have a magic source of money that makes them less abrasive redistributors of public funds than challengers appear to be. This is because the incumbent can promise a "certainty equivalent" level of income to all voters that is above the certainty equivalent that the challenger can promise. This certainty equivalent level of income is implicit in the function that determines how much expected utility a particular voter expects from the incumbent (I have avoided indexing this function for each voter in order to keep the notation manageable):

$$U(Y_I^{certainty}) = u(Y_I) + \frac{1}{2}\sigma_I^2 u''(Y_I) \Rightarrow \quad (18)$$

$$Y_I^{certainty} = U^{-1}[u(Y_I) + \frac{1}{2}\sigma_I^2 u''(Y_I)] \quad (19)$$

The certainty level of income a candidate can offer any voter depends on two quantities: the size of the government jackpot, and the variance of the candidate's perceived platform. The jackpot should be the same for incumbents and challengers. Once in power it does not matter who you were before coming into power. On this score, the level of certainty equivalent income that challengers and incumbents can distribute is the same. When it comes to certainty equivalent income generated by low variances of perceived platforms, incumbents have an advantage. The above equation says that the amount of certainty equivalent income a candidate can offer increases as the perceived variance of his platform decreases. The thought can be restated as, the certainty equivalent income a candidate can offer is the real income at his disposal from the government jackpot, less a risk premium R that adjusts for the variance of his perceived platform. For incumbent and challenger and a particular voter this can be written as:

$$Y_I^{certainty} = Y_I - R_I \quad (20)$$

$$Y_C^{certainty} = Y_C - R_C \quad (21)$$

The incumbent advantage lies in that $R_I < R_C$. The incumbent enjoys a degree of "tolerance" with voters. This tolerance is the difference between risk premiums: $Tolerance = R_C - R_I$. Tolerance is like a public good. As Shakespeare might have put it "The quality of *Tolerance* is not strained." No one is excluded from its benefit and there is no rivalry in voters' enjoyment of it. As the word indicates, *Tolerance* means that the incumbent has some room to offend voters without losing their support. The challenger has negative tolerance and has no room to offend.

How will an incumbent use his *Tolerance*? This depends on his strategy. I suggest that incumbents may trade off their tolerance for support from special interest groups. Anything that helps increase tolerance, such as an increase in campaign funds, could increase the incumbent's votes. Instead of allowing himself to come to power on a large majority, he may choose to dissipate his added *Tolerance*. He will dissipate *Tolerance* by favoring special interests at the expense of the majority.

I base these thoughts in part on Abramovitz's (1991) study of Congressional elections. He found that "The more often an incumbent voted with the opposing party on the floor, the greater his margin of victory became...a representative who voted with the opposing party 100% of the time would have added almost 10 percentage points to his margin over the challenger as compared with the margin he would have received if he had voted strictly along party lines." In other words, by always trying to please the majority, incumbents can win votes.

Why would the incumbent want to favor a minority and how would the process enrich the incumbent? Here we enter a speculative zone of political research. It is reasonable to assume that incumbents want material and psychological benefits in return for pleasing their supporters. But this assumption is vacuous unless we have a sense of how important material benefits are to incumbents. Do they really try to convert the power of their station into personal wealth? Views on this question are mixed because evidence is scarce. The guise in which wealth comes to the incumbent is hard to spot. Incumbents who do favors for some groups of interests will later be hired by those groups. Or the incumbent's children will be hired. The variety seems endless. Compensation for official favors does not fit into one mold.

To squeeze as much out of his office as he can, the incumbent may wish to grant favors

to special interest groups. He may wish to concentrate his favors because small, highly organized groups are better able to return the favor than large, unorganized groups. The molasses growers of the US get to sell their sugar in the US at twice the world price. Politicians protect these growers because the growers are better organized and informed than the millions of Americans who are forced to pay a cartelized price for their sweets. If politicians ended sugar protection they might lose more material payback from the molasses lobby. The loss of this material support may outweigh the value of the votes that politicians gained from a public that is please with low sugar prices.

If we accept that incumbents have a tendency to transfer resources away from the majority to the minority, then these incumbents will exploit their tolerance. What is the formula by which incumbents convert *Tolerance* into riches for their clique? This is an important question. If it is hard for the incumbent to convert *Tolerance* to riches, he will try to maximize votes, and not worry about finessing his platform for some hidden material gains. In such a case we would expect to observe that incumbents have lower marginal products than challengers for all the reasons laid out in the traditional story I told in Section 2 of this essay. If the incumbent is able to convert *Tolerance* to material riches, the story can take endless twists. The exploitation of tolerance will depend on how challengers and incumbents time the announcement of their platforms. If the challenger announces first, the incumbent with a positive tolerance can dominate any challenger strategy, simply because he has more resources to redistribute. By taking the same position as the challenger on how he will redistribute material resources, the incumbent can win, because in addition to material resources he offers everyone a greater sense of security that he can deliver on his promises. In other words, he has more "shadow income" to redistribute. If the challenger's strategy is to concentrate resources into a few hands the incumbent can offer the same package and maximize his material takings without even depleting his tolerance. If the challenger's strategy is not to redistribute resources from one group to another, the incumbent can still win by redistributing money to a select few. But the incumbent's margin of victory will be small because he has exhausted his tolerance. In this last case, campaign spending will not seem to help the incumbent much. He will use money to increase his tolerance. Then he will dissipate this tolerance by favoring special interest groups, who then pay the incumbent off. Money in this setting does not get votes: it gets money.

I do not believe that candidates behave entirely like this. Winning with big margins is comforting for most candidates. But maximizing votes is not the sole purpose of running for office. Dictators trade off popular support against personal riches, as several authors have argued [Usher and Engineer 1987, Palda 1993]. Why not candidates in democratic elections? Democracy puts a limit to the forms this tradeoff can take. But if these limits are weak, candidates will have room to trade votes for riches. The better they are able to make this tradeoff, the less effect will marginal increases in campaign spending appear to have on electoral outcomes.

3. Why Techniques of Measurement May Have to Change

If the story I have told of how candidates change platforms holds, then the way researchers tease results out of the data will have to change. For the last twenty years the following equation has held the profession's attention:

$$VOTES_I = a_0 + a_1S_I + a_2S_C + a_3DEMOGRAPHICS + \dots \quad (22)$$

The votes of the incumbent $VOTES_I$ are a function of his spending and challenger spending, plus district demographics such as average age and education of citizens. This equation needs a new variable: the candidate's platform. Proxies for such a variable are available in the ratings that liberal and conservative groups give to each candidate for Congress in the US. Another possible proxy is a candidate's willingness to cross the floor on House or Senate votes. This might be a better index of how eager he is to please the masses. If he does not cross often, he may be trying to exploit his *Tolerance*. To date Abramovitz is the only researcher I am aware of who has used such a proxy as a controlling variable in a regression measuring the effect of campaign spending on votes. He does not however seem to have been aware of the significance of his calculation. His results indicate that challenger campaign spending is more effective at winning votes than incumbent spending. More sophisticated efforts at measuring platform might include changes in taxes and government spending. Whether future results show that challengers get more bang per buck than incumbents, the theory cannot say. The theory is only there to tell us what is missing.

4. Policy Towards Incumbents

It would not surprise me if one day researchers get past these data problems and find that incumbents have the same marginal product of campaign spending (holding platforms constant) as challengers. They may even have higher marginal products. Incumbents hold office because they have political talent. This talent may compensate for the fact that incumbents drive down their marginal products by spending heavily between campaigns. Would this mean that campaign spending limits hurt incumbents? Reformers take this as the crucial question in campaign finance legislation. This is also the theme of the present paper: a limit helps the incumbent with a small marginal product because it allows him to convert more votes into personal riches. If limits harm incumbents, this must mean that they are good for the general public.

Caution is needed before jumping to such conclusions. If incumbents are proved to have the same marginal products of campaign spending as challengers, or even larger marginal products, a limit may lessen the incumbent's chances of winning. There seems to be nothing in such a situation to appeal to incumbents. Except that, incumbents may benefit from the limit because of the security it buys them. The incumbent may be willing to accept a lower chance of winning in return for the security that a spending limit will protect him from a powerful dark horse challenger. Risk averse incumbents may behave in the same fashion risk averse investors behave. They will accept a lower margin of victory in return for a more secure margin of victory.

Even if incumbents get no benefit of any sort from limits, there is a final question the researcher must consider before concluding that limits are a good thing. How does the welfare of voters change when candidates are less able to communicate with them? The Appendix suggests it does not matter whether the challenger or the incumbent has a bigger marginal product of campaign spending. Voters lose information with a limit. The loss reduces the benefit they expect from the outcome of an election.

To see what it means to lose utility from having less information I have derived the utility gain in dollars to the voter when the incumbent spends an extra dollar on his or her campaign. In the Appendix I show that this dollar value of utility is proportional to

$$\frac{d\$ \text{ Value of information}}{dS_I} \propto \gamma P_I \sigma_I \frac{\partial \sigma_I}{\partial S_I} \quad (23)$$

The first term γ is a coefficient of relative risk aversion. Its sign is negative. The second

term P_I is the probability the incumbent will win. The last term shows how incumbent spending will lower the variance of his or her perceived platform. Its sign is negative. The expression can be read this way: when an incumbent spends money he reduces the variance of his perceived platform. This has a positive expected dollar value of utility for voters. Ex ante their utility is higher because the incumbent's platform has not changed but the uncertainty surrounding that platform has fallen. This value is magnified if the incumbent's chances of winning are large (voters do not care much about reduced variance of platform if the candidate had no chance of getting into power). This effect is further magnified by the number of voters who hear the incumbent's message, and their degree of risk aversion. Risk averse voters will value information that reduces their uncertainty about candidate platforms. A similar relation holds for the challenger.

A limit reduces the expected utility of voters no matter what the relative sizes of incumbent and challenger marginal products. Suppose that incumbents get more bang per buck than challengers (the scenario that appears most favorable to the regulation of campaign spending). This means that $\frac{\partial \sigma_I^2}{\partial S_I}$, the influence of incumbent spending on the variance of his perceived platform, is larger for the incumbent than for the challenger. A ceiling will reduce the incumbent's chance of winning P_I and the effect will be magnified by the fact that people weigh heavily the variance of his platform. So on this score voter utility falls. But voters must also consider what is happening to challengers. The challenger's P_C rises by exactly as much as P_I fell. On this score voter expected utility rises. This effect though is not enough to outweigh what happened to the incumbent, because for the challenger the marginal effect of money on reducing variance $\frac{\partial \sigma_C^2}{\partial S_C}$ is smaller than the similar term for the incumbent. Put simply, a limit reduces the incumbent's chance of winning and this chance of winning is highly prized by voters because they have confidence in the incumbent's ability to carry out his campaign promises. The same story holds if challengers got more bang per buck from their spending. A spending limit reduces expected voter welfare no matter which candidate is more powerful. Only if candidates are evenly matched will a limit have no effect on voter welfare.

It is important to recognize the shortcomings of this analysis. Ex ante measures of utility are not very satisfying for understanding the benefits voters get from election races. All we are measuring is the benefit of reducing voter anxiety before an election outcome. If

elections are mostly about zero-sum redistributions of money, the final outcome will be a wash. What the winners gain will be balanced by what the losers have taken away from them. The importance of campaign spending for voter welfare cannot be understood by looking at an isolated increase or decrease in candidate outlays. The real importance of campaign spending for voter welfare depends on the setting in which campaign money is spent. In a competitive setting *a la* Becker (1958) where politicians are free to contest each others' arguments, spending will weed out candidates who lie or bungle. Campaign spending laws are part of the background in which candidates of quality evolve. Eventually these candidates may overrun others who impose needless deadweight costs on their people. If spending limits prevent this evolution, they will make voters unhappy. Formal support for such a conjecture is, however, a long way off. Such support awaits the arrival of indices that can measure the quality of a candidate, indices that measure the competitiveness of a political system, and techniques to relate these two indices and show that competitive electoral systems gives us quality candidates.⁸

Conclusion

The goal of this paper has been to show that there are problems with the way researchers think about the productivity of campaign spending. These problems distort the way we think about campaign spending limits.

A candidate may appear to get no votes for the money he spends. Researchers will find this result if at the same time as spending money, the candidate is shifting his platform. This may explain why empirical researchers have generally found that the marginal product of incumbent campaign spending is smaller than that of challengers. Some studies even find that campaign spending has no marginal product for the incumbent. Public policy essays have taken this to mean that money means more to challengers than it does to incumbents. Many researchers believe this is the reason incumbents favor spending limits.

These interpretations overlook that the marginal product they are measuring is the result not only of how much candidates spend, but also of their platforms. These platforms are

⁸For more on the relationship between spending limits and voter welfare, the interested reader may consult several authors. Aranson and Hinich (1979), and Mueller and Stratmann (1994).

determined by each candidate's strategy. The observed marginal products are *equilibrium* values that tell us as much about candidates' strategies as they do about the inherent productivity of their campaign spending. This means that the effect of spending limits may go beyond increasing the vote margins of incumbents. An incumbent can win quite handily even without limits by choosing a platform that gives him a very high productivity of funds. But such a platform might not give his loyal supporters as much as they had wished for. The incumbent might therefore want to choose a platform that maximizes the return to his supporters. Such a platform would not necessarily be the one which wins him the most votes. Instead of winning the incumbent more votes, the major function of a spending limit could be to assure his supporters a larger share of the government ``jackpot."

APPENDIX

Deriving a Candidate's Marginal Product of Campaign Spending

To see how spending changes a candidate's vote count we first have to get an expression for his total vote count. Let us consider the incumbent. Citizen i will vote for the incumbent if his $\dot{E}_{I,C}^i > 0$. This means that the incumbent's total vote count is the number of citizens for whom this inequality holds. The shaded area in Figure 3 shows the proportion of votes the candidate would gain. I have drawn a uniform distribution of voters purely for convenience. Total votes is the integral of this curve between zero and the maximum delta to be found among voters ($\dot{E}_{I,C}^{max} > 0$):

$$Voteshare = \int_0^{\dot{E}_{I,C}^{max}} K d\dot{E}_{I,C} \quad (24)$$

$$= K\dot{E}_{I,C}^{max} \quad (25)$$

where K is a constant representing the height of the uniform distribution. It is tempting to simply take the derivative of this function with respect to campaign spending to get at the marginal product of spending, but this would be a mistake. Consider the effect of campaign spending on individual i 's propensity to vote for the incumbent:

$$\frac{\partial \dot{E}_{I,C}^i}{\partial S_I} = \frac{\partial \sigma_I}{\partial S_I} u''(Y_I^i)$$

This term differs for every individual because income in the uniform distribution case differs for every individual. A fall in the incumbent's variance brought about by a rise in campaign spending will have a different effect on each voter's propensity to vote for the incumbent. Voters who expect less income from the incumbent will feel a larger increase in their propensity to vote for him because low income means a greater sense of risk aversion. A reduction in variance will have a very reassuring effect on them. The fact that spending has a different effect on each voter means that a rise in spending does not simply shift the distribution to the right. It bunches the distribution up at its lower levels. Changes in campaign spending actually change the distribution function. Though it is beyond the scope of this essay to derive an analytical expression for such a function, several pertinent qualitative observations are possible. Researchers have a tendency to think that the incumbent's marginal product of campaign spending is low. Implicitly they may have in mind the $\frac{\partial \sigma_I}{\partial S_I}$ term of the above equation. It is true that spending changes this quantity but what is important for the marginal product is the term that multiplies this quantity, namely $u''(Y_I^i)$. If the incumbent has a policy of redistributing heavily from the lower income groups to a preferred few, there will be many people for whom this second term is large. This will tend to increase the incumbent's marginal product of spending and this effect may dominate the low bang per buck his money gets in reducing the variance of his perceived platform. Of course a high marginal product does not mean high votes. His marginal product is high precisely because the incumbent may be sacrificing votes to win kickbacks from special interests. The larger point is that the platforms candidates adopt (the distribution of incomes Y^i) play an important role in their marginal products of campaign spending. This means that candidate strategies may be just as important to marginal products as technical considerations governing a diminishing scope of people they can reach through advertising.

Value of Information

To calculate the dollar value of utility voters get from extra spending by the incumbent, we first note that the utility rests on several layers of uncertainty. He is uncertain of which candidate will make it into office, and once in office, he is uncertain of how the candidate

will perform. This means that voter i 's overall expected utility is:

$$\mathcal{E}(u_i) = P_I(S_I, S_C)E[u(Y_i^I)] + [1 - P_I(S_I, S_C)]E[u(Y_i^C)]$$

where P_I is the probability the incumbent will win, S denotes spending by either the incumbent I or the challenger C , $E[u(Y_i^I)]$ is the utility voter i can expect from the incumbent over his term of office, if the incumbent wins the election. The change in overall expected the utility the voter experiences when the incumbent increases his spending is to simplify the notation I have let E_I stand for $E[u(Y_i^I)]$:

$$\frac{\partial \mathcal{E}(u_i)}{\partial S_I} = \frac{\partial P_I}{\partial S_I} E_I + P_I \frac{\partial E_I}{\partial S_I} - \frac{\partial P_I}{\partial S_I} E_I + (1 - P_I) \frac{\partial E_C}{\partial S_I} \quad (26)$$

$$= \frac{\partial P_I}{\partial S_I} (E_I - E_C) + P_I \frac{\partial E_I}{\partial S_I} + (1 - P_I) \frac{\partial E_C}{\partial S_I} \quad (27)$$

$$= \frac{\partial P_I}{\partial S_I} \dot{E}_{I,C} + \mathcal{E} \frac{\partial \dot{E}_{I,C}}{\partial S_I} \quad (28)$$

This says that the individual may experience either an increase in expected utility or a decrease in expected utility when the incumbent increases spending. Suppose the individual does not like the incumbent ($\dot{E}_{I,C} < 0$). Then if advertising raises the incumbent's chance of winning, the voter's expected utility falls. However, a rise in spending also clarifies the candidate's position. This effect always increases the voter's utility because it narrows the possible range out good and bad surprises he anticipates. Being risk averse, he values a decrease in the downside more than an increase in the upside. It is really this second term to consider when discussing the value of information. It represents the degree to which campaign advertising clarifies the candidate's position. Campaign spending of the incumbent S_I affects this term by changing σ_I (for the remainder of this exposition I will assume that the incumbent cannot change the variance of the perceived challenger platform, so that $\frac{\partial E_C}{\partial S_I} = 0$). So the final effect on utility will depend on how well advertising can change the perception of risk and on how risk averse the voter is. We can isolate this last term in more detail. From the definition of \dot{E} in the main body of the text:

$$\mathcal{E} \frac{\partial \dot{E}_{I,C}}{\partial S_I} = P_I \sigma_I \frac{\partial \sigma_I}{\partial S_I} u''(Y_i^I)$$

Dividing both sides by $u'(Y_i^I)$ gives the dollar value of utility of the information revealed by extra incumbent advertising:

$$P_I \gamma_i \frac{\partial \sigma_I}{\partial S_I} \gamma_i$$

where γ_i is voter i 's coefficient of relative risk aversion.

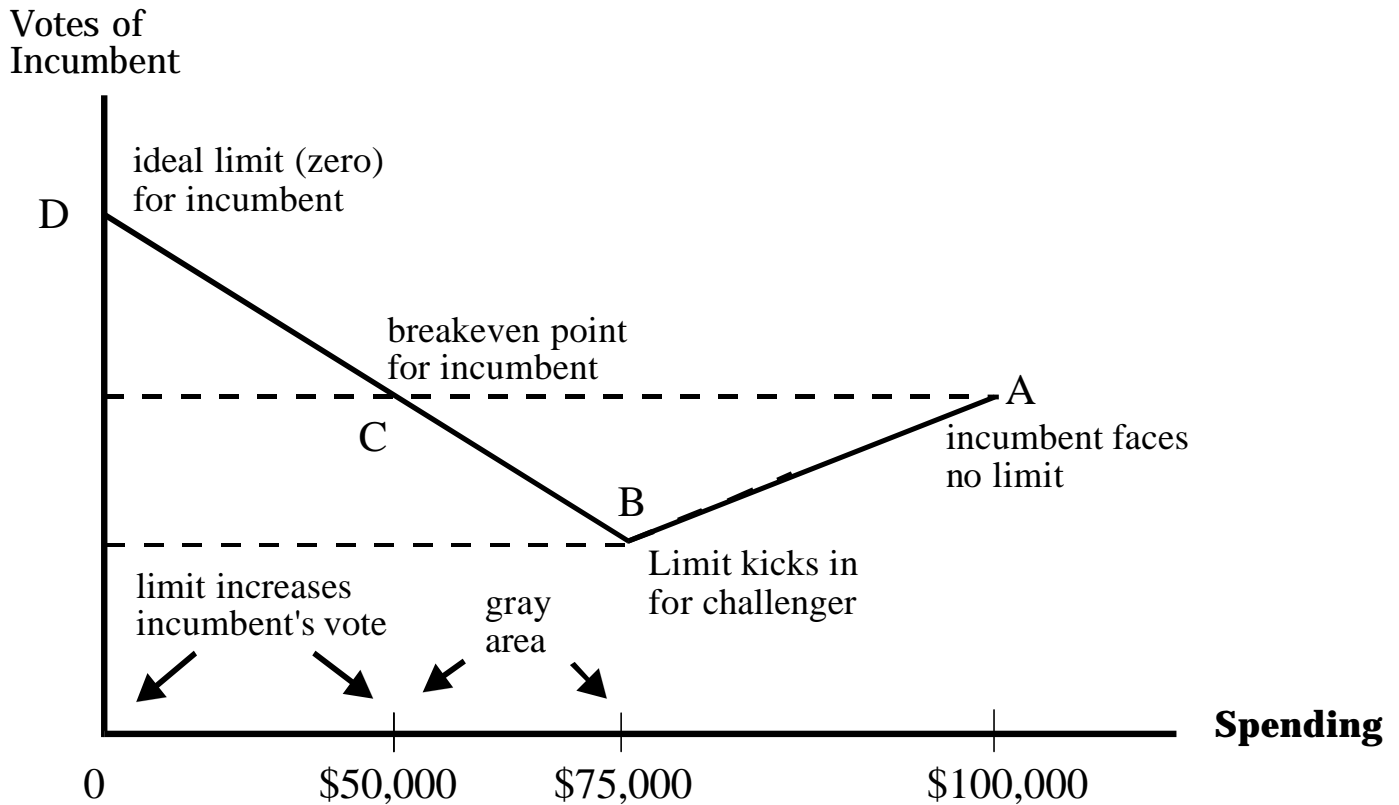
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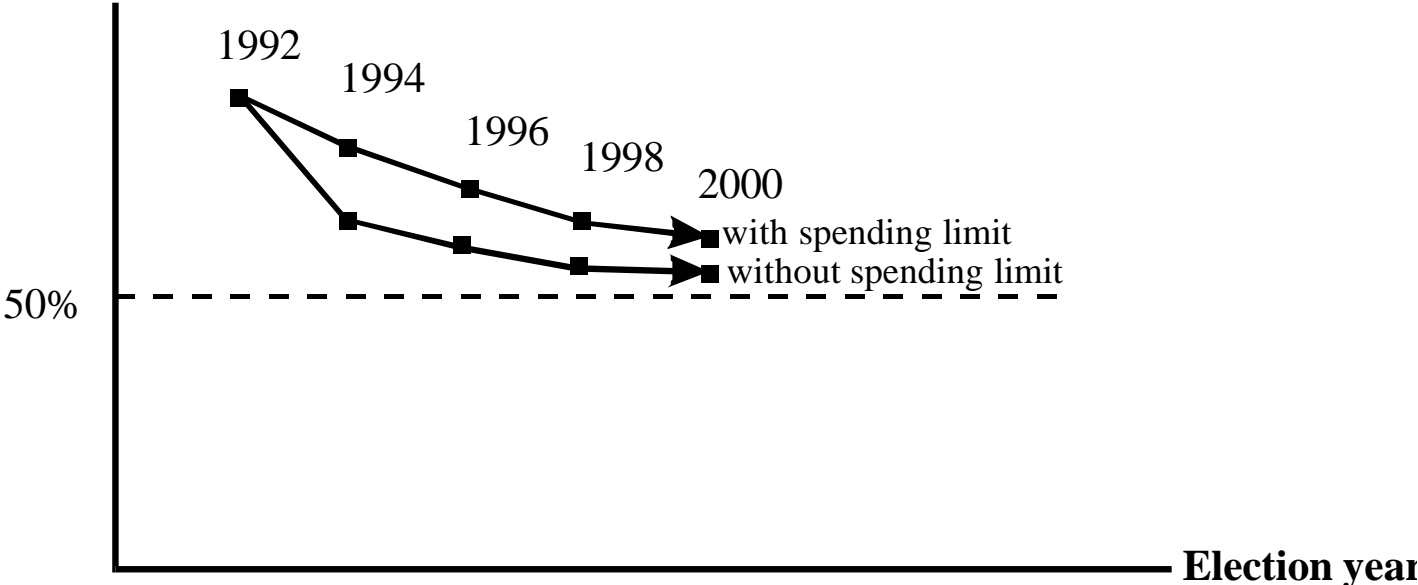
Figure 1: The Relation between Incumbent Spending and Incumbent Votes Under Different Assumptions about Spending Limits and the Level of Challenger Spending



Note: The incumbent starts the race with \$100,000 and the challenger with \$75,000. The solid line between points A and B shows how the incumbent's vote would fall for any value of limit between \$100,000 and \$75,000. At a \$50,000 limit both challenger and incumbent are constrained but the incumbent begins to gain votes because his marginal product of spending is smaller than the challenger's. At point C, the incumbent gets as many votes as without a ceiling *but* only has to spend \$50,000 to get this result. This analysis assumes that the marginal product of challenger spending stays above that of the incumbent.

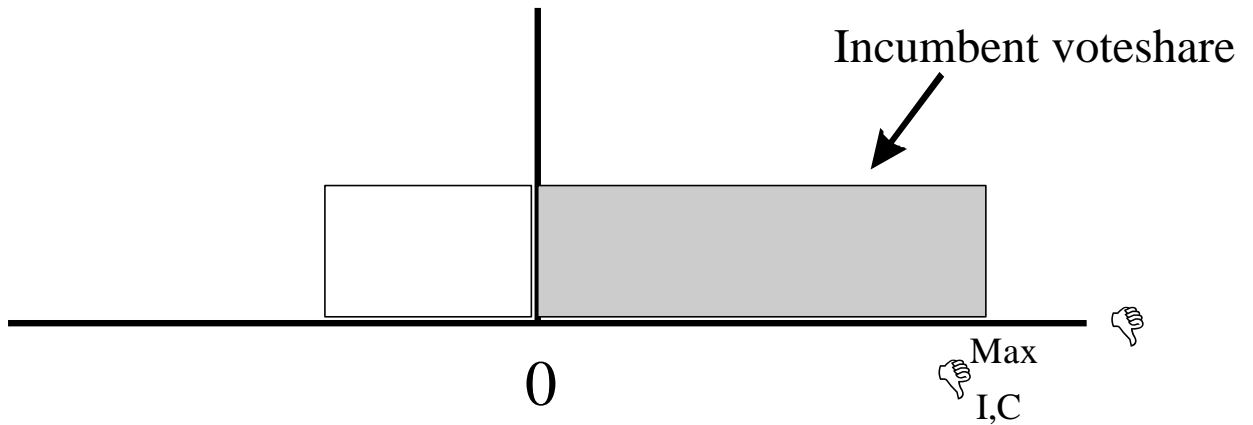
Figure 2: Simulated Effect of Spending Limit Introduced in 1992, on the Percent of Legislative Seats Held by the Ruling Party

% of seats held by ruling party



Note: The spending limit is introduced in 1992. The limit does not raise the ruling party's percentage of legislative seats. Instead, the limit slows the ruling party's slide to equality with the challenging party.

Figure 3: Incumbent Voteshare



Note: The distribution of voter propensities to favor the incumbent is uniform in this example. This means that the incumbent's share of the overall vote is the shaded area to the right of zero.

TABLE 1

**SIMULATION OF HOW THE SEATS OF THE
INCUMBENT PARTY AND ITS OPPOSITION
CHANGE OVER THE COURSE OF THREE
ELECTIONS**

	Republicans		Democrats	
	Incumbents	Challengers	Incumbents	Challengers
Before first election	20	10	10	20
Before second election	17	13	13	17
Before third election	16	14	14	16

In this Table, Republicans control the legislature with 20 seats. Democrats have 10 seats. Each incumbent of both parties has a 70% chance of winning. Over time (after five elections) the parties will converge to an equal number of seats.