

**How Prices Matter in Politics:
The Returns to Campaign Advertising**

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The apparent ineffectiveness of incumbent campaign spending in congressional elections is one of the major puzzles in the political economy literature. Previous work has assumed that the price of media advertising is the same in each congressional district, and that therefore campaign spending equals campaign advertising, regardless whether or not incumbents campaign in high media cost districts. This paper emphasizes the importance of media advertising prices for the analysis of campaign spending and shows that differences in advertising costs is one source of the apparent ineffectiveness of incumbent spending. Accounting for the price of advertising, this paper shows that campaign spending is productive for both incumbents and challengers. Moreover, campaign advertising is most productive for relatively unknown candidates.

The apparent ineffectiveness of incumbent campaign spending in congressional elections is one of the major puzzles in the political economy literature. The literature is filled with results that campaign spending by incumbents either reduces their election chances or has no effect on their chances of winning (see, for example, Jacobson 1978, Abramowitz 1988, 1991, Grier 1989, Coates 1998, Feldman and Jondrow 1984, Ragsdale and Cook 1987, Ansolabehere and Gerber 1994, and Levitt 1994). These results are puzzling against the backdrop that incumbents appear to spend much effort on fundraising activities, and given the popular view that money is important for winning elections.¹

The extent to which campaign spending is productive for increasing vote shares is of relevance of the campaign finance regulation debate. If spending helps neither incumbent nor challenger, then curtailing campaign spending may not alter the identity of winners in elections. However, if spending is productive or has different levels of productivity between incumbents and challengers, or within the groups of incumbents or challengers, then limits may alter the identity of the winning candidate.

Motivated by the puzzling effects of incumbent spending on their vote shares, scholarly work has focused on the possibility that regression models suffer from an omitted variable bias. If incumbent quality is unobserved, the campaign spending coefficient is biased downwards since high quality incumbents get elected even if they spend little, while low quality incumbents who are in close races have to spend heavily in their reelection campaigns. Since the early work by Jacobson (1978), much effort has been spent on either solving this omitted variable bias through

¹That money is important for winning elections has been noted early on. In 1895, Marcus Hanna, who organized election campaigns, said, “There are two things that are important in politics, the first is money, and I can’t remember what the second one is.” WSJ - pB1, 3/24/2004.

improved statistical techniques, or through better measures of candidate quality and district preferences (see, for example, Green and Krasno 1990, Levitt 1994, Erikson and Palfrey 1998, Gerber 1998, Milyo 2001).

However, none of this scholarly work has considered that the same amount of campaign spending may yield different amounts of campaign advertising depending on whether a race takes place in a high priced or a low priced media advertising market. Previous work has assumed that the price of advertising equals one, so that campaign spending equals campaign advertising. This assumption implies that the same amount of campaign spending buys the same advertising, regardless of the price that candidates have to pay for media advertising. The equal price assumption justifies the use of campaign spending as a proxy for campaign advertising spots.

The assumption of equal advertising prices implies that the same amount of campaign spending purchases the same amount of campaign advertisements in a high media cost districts located in New York City, as in a low media cost districts located in Idaho. However, theoretical models predict that campaign advertisements, not merely campaign spending is important for vote shares (Mueller 2003). The use of campaign spending, however, allows for no inferences about the quantity of advertisements when media prices vary across districts. This paper emphasizes the importance of media prices for the analysis of campaign spending, and is the first study that accounts for differences in campaign advertising prices across districts.

This paper shows that campaign advertising, as opposed to campaign spending, has a positive and statistically significant effect on incumbents' vote shares, even without controlling for the potential endogeneity of advertising. The positive marginal effect of incumbent campaign advertising increases when addressing the possibility endogeneity of advertising. Finally, when

addressing the fact that not all campaign spending is used for media advertising, the productivity of campaign advertising increases further.

One of the implications of the hypothesis that campaign advertising and not campaign spending matters for vote shares is that candidates with little or no name recognition have a higher marginal product of advertising than those with such recognition. This paper shows that the data support this implication. Relatively unknown incumbents and challengers have a higher marginal product of advertising than candidates who are better known.

The next section of the paper presents the hypotheses and describes the variation in advertising costs across districts and the importance of advertising spending as a part of total campaign spending. Section III presents the data and methods used in this analysis. Section IV presents the results based on overall campaign spending and section V presents results using more detailed data on media advertising expenditures. Section VI concludes.

II. Advertising and Campaign Spending

Candidates in election campaigns reach voters by mailings, person-to-person contacts, by airing radio and television commercials, and by other means. Funds spent on media advertisements comprise the largest share of the election campaign budget (Fritz and Morris 1992) and thus the advertising price is one determinant of how much money candidates have to spend in order to transmit their campaign message. As discussed in more detail later, in 1990, for which a breakdown of campaign expenditures by expenditure category is available, candidates spend over half of their budget on communications spending and media advertising was the largest part of this type of spending.

A measure of the price of media advertising is the advertising cost per rating point for a television market (Designated Market Area, or DMA) as defined by *Nielsen Media Research*. These data are disseminated by *Spot Quotations and Data, Inc. (SQAD)*. The cost per point measure for television is an estimate of the dollars required to deliver one rating point (or one percent of the audience of a designated population within a TV market area) during prime time. The price data are for a thirty second advertisement during prime time. In this study I will use prices from the third quarter of the election year.

The *Nielsen* DMA definition does not change by much from year to year and so that the geographic area of these markets is relatively stable over time. There were 211 television markets in the United States in 1996 and the same number of markets in 2000. In the year 2000, the price of television advertising ranges from \$7 in the North Platte, Nebraska market to \$1,676 in the Los Angeles, CA market and \$1,875 in the New York, NY market. The source of this price variation is primarily the number of potential listeners in a DMA.

Nielsen provides documentation on which geographic area is covered by the a *Nielsen* television market. I mapped DMAs into congressional districts, so that I could calculate the price for television and radio advertisements in each congressional district.²

The larger the share of advertising spending as a fraction of total spending, and the larger the variation in advertising prices, the more important is it to use campaign advertising to explain

²When a media market contains several congressional districts, I define the district advertising cost in the each district as the advertising price in the media market. When a congressional district contains several media market, I define the district advertising cost as the sum of the advertising prices in each media market divided by the number of markets. For the latter case, as a sensitivity test for the construction of district media prices, I constructed a price measure defined as the sum of the prices over all DMAs in the district. The estimates reported in this paper are very similar to those using the latter measure.

vote shares, instead of campaign spending. Some anecdotal and some systematic evidence suggests that media advertising is a significant component of overall campaign expenditures. For example, a headline the Washington Post claims that “In Presidential Race TV Ads were biggest ‘96 Cost By Far” (March 31, 1997, page A19). Further, Herrnson (2000) provides evidence that media advertisement expenditures are a significant component of total campaign spending. PaineWebber analyst Leland Westerfield estimates that in 2000, TV broadcast advertisements reached \$1 billion dollars and that radio, print, and TV combined contribute to 80 percent of campaign expenses. This estimate includes presidential, federal, and state races.

The most systematic evidence regarding the importance of advertising spending is available for the 1990 election from the unique data source *Handbook of Campaign Spending* (Fritz and Morris 1992). Unfortunately, these data are not available for recent time periods. This source breaks down total campaign spending into categories such as funds spent on communications, overhead, polling, fundraising activities, and gifts to constituents.³ Communication spending is the sum of spending on media advertising, door-to-door campaigning, and mailings. An analysis of these data shows that House challengers in contested races spend 58 percent of their total funds on campaign communications and that incumbents spend 42 percent of their money on communications (Table A2). Although approximately half of all funds are not spent on voter communication activities, the correlation coefficient between

³This break down is available only for campaigns in the 1990 and 1992 elections. I did not utilize data from 1992, because in 1992 over eighty percent of the incumbents were subject to redistricting. Thus, measures of constituency preferences of these incumbents, such as their previous district vote shares, are not available. Further, the impact of advertising may differ by the degree to which an incumbent was subject to redistricting, because an incumbent may have developed a brand name with votes who are familiar with the incumbent from previous campaigns.

spending on communications and total spending is 0.75 for incumbents in contested races and 0.82 for challengers. Thus, communication spending and overall spending are moving closely together. Media advertising is a component of communications spending and constitutes 24 percent of total incumbent spending and 31 percent of total challenger spending (Table A2). The correlation coefficients between total spending and media advertising are 0.73 for incumbents and 0.87 for challengers.

These stylized facts suggest that advertising is an important part of overall campaign activities. The large variability of the advertising prices across districts suggests that overall spending is a poor indicator of the number of commercials aired by the candidate. Since campaign advertising closely tracks overall campaign spending, I use total campaign spending in the 1996, 1998, and 2000 elections to compute a measure of the number of advertisements.⁴ Assuming that total spending equals the number of media advertisements times by the price of advertisements, the number of media advertisements is the ratio of campaign spending over the advertising price.⁵ Thus, advertising is computed as total campaign spending divided by the price of television advertising.

The hypothesis that the number of advertisements and not total campaign spending matters for the likelihood of winning an election, has implications for how the advertising estimates differ when examining advertisements as opposed to total spending. First, it implies

⁴No breakdown of total campaign spending into various categories of spending is available for the election years examined in this study (1996, 1998, and 2000).

⁵As a robustness check I also calculated the number of advertisements using the price of radio advertising, which are based on *Arbitron* radio markets. The results from this measure are very similar to those reported in this paper.

that campaign advertising has a positive effect on vote shares candidates, while campaign spending may not. Secondly, if advertising is most important for those who have the least name recognition (Mueller 2003), then advertising will be most productive for relatively unknown candidates. If total spending is only a poor indicator of advertisements, this relation is not predicted for total campaign spending. In the data analysis I will define relatively unknown incumbents as incumbents freshmen, and relative unknown challengers as challengers who have not held elected office prior to running for a seat in the U.S. House of Representatives. If advertising is important for gaining vote shares, then the marginal product of advertising will be larger for relatively unknown candidates. Third, if advertising, and not total spending is productive, a positive relation between advertising and vote shares is predicted when the number advertisements is not calculated off total spending but off spending on media advertisements.

III. Data and Methods

The empirical model estimated in this paper is

$$ivote_{it} = a + \beta IA_{it} + \gamma CA_{it} + \theta \mathbf{X}_{it} + \mu_t + \epsilon_{it} . \quad (1)$$

The unit of observation is an incumbent U.S. House Representative i running for reelection in state s in year t . The dependent variable is the percentage of the popular vote for the incumbent ($ivote$) running for reelection in 1996, 1998, and 2000. Explanatory variables are advertising by the incumbent (IA), by the challenger (CA), and a vector of district and candidate specific characteristics \mathbf{X} , and year effects μ_t .

I will employ three alternative specifications for candidate advertising. In one specification, advertising enters the regression equation in linear form. To allow for a

diminishing marginal effect of advertising I will also have advertising enter in a logarithmic form, and in an alternative specification, as a square root.

The \mathbf{X} vector includes the vote percentage the incumbent received in the previous election. This variable captures whether the district is Republican-leaning or not, and thus is a measure of constituency preferences for the incumbent. The vector also includes challenger quality. Challenger quality is measured by whether the challenger has held a public office prior to running for office in the House election (Jacobson and Kernell 1983, Gerber 1998, Green and Krasno 1988, Abramowitz 1988, Squire 1989).⁶ I include challenger quality because this variable determines both challengers' vote shares and their campaign advertising. Thus, excluding it would lead to a biased estimate on challenger spending. To test whether the estimated coefficients on advertising are sensitive to a specific measure of challenger quality I develop an additional challenger quality measure where this quality variable is measured on a four-point scale (3=previous congressional office, 2=previous state legislator, 1=other publicly elected office, 0=no office). Also included in the \mathbf{X} vector is the length of incumbents' tenure, as it has been shown to be a predictor of vote shares (Abramowitz 1991).

Since the beginnings of analyzing the effects of campaign spending scholars have noted that unobserved variables affect both an incumbent's vote share and his or her campaign spending. These variables may include unobserved ideological leanings in a congressional district or unobserved quality of an incumbent. For example, an incumbent with a good reputation and a track record of providing good service for his constituency may receive a large vote share even if he or she spends little on the reelection campaign. In this situation the

⁶I would like to thank Gary Jacobson for providing me with the challenger quality data.

coefficient on incumbent spending is biased downwards. Similar issues exist for estimates for challenger spending. Challengers who are of high quality may attract campaign contributions, have more campaign spending, and may receive a high vote share because of their quality. This would lead to an overestimation of effect challengers' campaign spending. The coefficient would be underestimated if unobserved variables lead to higher challenger vote shares and less challenger spending. One possible way of addressing this issue is to include a the previously discussed measure of the challenger quality (see, for example, Green and Krasno 1988).

While the previous discussion focuses on campaign spending, the rationale as to why incumbent spending is endogenous also applies to incumbent campaign advertising. In this paper, I will address the omitted variable bias using two-stage least squares. To address the endogeneity of incumbent advertising an instrument is required that is correlated with incumbents' advertising, but uncorrelated with unobservables that affect advertising and vote shares. If the challenger quality variable in the \mathbf{X} vector is a weak proxy for true underlying challenger quality, the coefficient on challenger advertising is biased in addition to the coefficient on incumbent advertising. In this case a second instrumental variable is required to address the bias on both advertising coefficients.

Table 1 presents descriptive statistics. The data cover the 1996, 1998, and 2000 election cycles. Campaign expenditure data and vote shares were obtained from the *Federal Election Commission*. The sample examined is the universe of contested races. These races also include races where some candidates have no campaign expenditures. In contested races incumbents spent on average \$800,000 and spending ranges from \$57,000 (Marshall Sanford from South Carolina) to \$80 million (Newt Gingrich, Georgia). Challengers spend on average \$275,000.

Their spending ranges between zero dollars to \$44 million. Challenger spending is more variable than incumbent spending if measured by the coefficient of variation. Incumbents receive, on average sixty-four percent of the popular vote. They received sixty-five percent of the popular vote in the previous election. Incumbents who run for election have been in Congress an average of five election cycles and twenty-two percent of these incumbents face challengers who have held an elected office prior to running for a seat in the U.S. House of Representatives.

The mean cost of television advertising is \$419. As seen from Table 1, the variation in television and advertising cost is relatively large, as evidenced by the fact that the standard deviation is larger than the mean of this variable. This variation in media prices shows that the assumption that advertising prices are the same across district may not be useful when examining the effect of campaign advertisements. Holding campaign spending constant, less advertising can be bought in low cost than in high cost media markets.

Assuming that total spending is the product of the number of advertisements and the price per advertisement, the number of advertisements is the ratio of total spending and the price of advertising. The mean number of advertisements is 6.3 (measured in thousands) for incumbents and 1.9 for challengers. For both incumbents and challengers the coefficient of variation for advertising is larger than the coefficient of variation for spending. This suggests that the assumption that advertising prices are the same across districts leads to an understatement of the actual variation in campaign activities across districts.⁷

Incumbent campaign spending and campaign advertisements (campaign spending divided

⁷Similarly, for 1990, the coefficient of variation for number of advertisements, calculated off actual media advertising spending, is between two and three times as large as the coefficient of variation for the dollar amount of media advertising spending.

by the media price) are positively correlated. Their correlation coefficient is 0.33 and is statistically significant. For challengers, the correlation coefficient between spending and advertising is 0.51. Since advertising tracks spending more closely for challengers, one expects that campaign spending is a relatively better measure of advertising activity for challengers than for incumbents.

For the initial estimates I will assume that all campaign spending due to media advertising. As a next step I will use detailed data from 1990, that break down campaign spending into various components, to analyze how and whether conclusions have to be changed when they were derived from the initial analysis. The latter analysis will shed light on whether or not media advertising is the source of campaign spending's productivity and on whether or not candidates move to less productive forms of advertising when they substitute away from media advertising.

IV. Results

To compare the results obtained from campaign advertising to those from campaign spending, I first show results from specifications with campaign spending. The OLS estimates from campaign spending are similar to those in previous studies (Table 2). The three columns of table 2 report results when the campaign expenditure variable enters either in linear, log, or in a square root form. The results show that more incumbent spending has either no effect or a negative and statistically significant and small effect on their vote shares. Challenger spending increases challengers' vote shares. For example, a challengers' vote share rises by 0.7 percentage points if she or he spends an extra \$100,000 (Table 2, column 1).

The estimates on the remaining covariates have the signs and similar levels of statistical significance as previously reported in the literature. When an incumbent faces a high quality challenger his vote share is reduced by about two percentage points. Replacing the challenger quality indicator with an ordinal quality measure, also leads to the conclusion that higher quality challengers reduce incumbents' vote shares (not reported in the tables), while having no discernable effect on the other estimates in the regression model. As expected, if an incumbent received a higher vote share in the previous election, he or she is more likely to receive a high vote share in the current election. Length of service has a consistently negative effect on incumbents' vote shares, but the effect is not statistically significant in most specifications. Abramowitz (1991) hypothesized that senior incumbents have lower vote shares because they focus increasing their influence in the House instead of providing services for the district.

While campaign expenditures in Table 2 show a negative effect of incumbent campaign spending on their vote shares, campaign advertising in Table 3 has a positive and statistically significant on incumbents' vote shares. Challenger advertising has a negative effect on incumbents' vote shares. The control variables, such as party affiliation, the incumbent's vote share in the previous election, length of service and challenger quality have a similar effect on the incumbents' percent of the popular vote as in reported in Table 2.

The point estimate on incumbent's advertising implies that 1,000 extra campaign advertisements increase the incumbent's percent at the election by 0.14 percentage points and the same amount of advertising by challengers increases challengers' vote percentage by 0.6 percentage points. The point estimate on incumbent advertising implies that doubling of average incumbent advertising increase their vote percentage by 0.9 percentage points. An alternative

way to examine the magnitude of the estimated effect is to examine the consequences of a one standard deviation change in advertising. The estimates for Table 3, column 1 imply that a one standard deviation change in advertising by incumbents increases their vote percentage by 0.13 standard deviations and for challengers the corresponding increase is 0.29 standard deviations.

The point estimates on incumbent and challenger advertising are statistically significant regardless of whether or not campaign advertising is expressed in linear, log, or in square root form. In all specifications challenger advertising is over four times as productive as incumbent advertising.

Considering that differences in the price of advertising translate into differences in the number of advertisements has important consequences for conclusions regarding the productivity of incumbent campaign activities. While incumbent campaign expenditures have a negative effect on their vote shares, the marginal product of incumbent advertising is positive and statistically significant.

The results show that the magnitude of the estimated coefficients on advertising are small. The quantitative results in Table 3 are similar to those in Levitt (1994), who examines a sample of repeat challengers using repeat challenger fixed effects. The magnitude of Levitt's campaign spending coefficients are similar to the magnitudes of the advertising coefficients reported in Table 3, although Levitt's point estimates are not statistically significant. The regressions in Table 3 do not control for unobserved differences in incumbent or challenger quality and the fact that Levitt's findings are similar in magnitude to the findings reported here may suggest that in his analysis the repeat challenger fixed effects have taken out the variation in advertising costs across districts, in addition to other unobserved candidate characteristics.

As noted previously, the 1990 data show that advertising spending comprises 23 percent of incumbent spending and 31 percent of challenger spending. The regressions in Table 3 underestimate the marginal effect of both incumbent and challenger advertising since those regression are based on total spending. Assuming that incumbents and challengers in recent elections spend similar fractions of total spending on advertising as they did in the 1990 election, the point estimates in Table 3 are underestimated by a factor of four for incumbent and a by factor of three for challengers. Adjusting the estimates accordingly, 1,000 extra advertisements increase incumbents' vote shares in the linear specification by over half a percentage point.

The campaign advertising measure does not solve the endogeneity issue of campaign activities. Incumbent advertising is endogenous, as quality and reputation affect both campaign advertising and vote shares. Since I have a measure of challenger quality, for now I will assume that challenger advertising is exogenous, although I will relax this assumption in later regressions. To address the endogeneity of incumbent advertising, I use an instrumental variable technique, where I use the square miles in a congressional district as an instrument for the number of advertisements.

Television signals and FM radio signals carry only over a limited number of miles. While reception also depends variables such as obstacles, for example large building and the strength of the emitting signal, television signals carry between 30 and 100 miles. The limited transmission of television signals implies that larger geographic areas must have more television stations in order to provide the population residing in that area with coverage. Larger geographic areas tend to have more television stations. For example, Montana, which has only one congressional district, has eight local NBC stations, while Vermont, which also has one congressional district,

has one local NBC station. Thus, incumbents who run for reelection in larger districts have to seek out more television stations in order to get their campaign message out and this increases the number of campaign messages the incumbent has to send if he wants to reach the entire district population. This generates a positive correlation of district size with the number of campaign advertisements, and I will use the square miles in a congressional district as an instrument for incumbent advertising.

First stage results are reported in the appendix Table 1A. Those results show that *ceteris paribus*, district size is positively correlated with advertising messages. The point estimate in the linear specification in the first column of Table 1A implies that 1,000 extra square miles per congressional district leads to an increase of 80 advertisements. The point estimates are statistically significant regardless as to whether incumbent spending is in a linear, log, or square root form.

Table 4 reports the second stage of the 2SLS results. The magnitude of the coefficients on incumbent advertising increases relative to OLS estimates in Table 3. This is consistent with the view that unobserved variables bias the incumbent advertising coefficient downward when estimating the equation with OLS. The point estimates in the first column of Table 4 implies that a 1,000 unit increase in incumbent campaign advertising units lead to a 0.3 percentage point increase for incumbents while the same amount of advertising leads to a 0.8 percentage point increase for challengers. The advertising coefficients are statistically significant regardless of the functional form of the advertising variables. The estimates on log spending suggest that a one percentage increase in incumbent advertising increase their vote share by 0.056 percentage points. Thus, an increase of 1,000 advertising messages, which is a sixteen percent increase

relative to the mean, leads to a 0.9 percentage point increase. The remaining covariates have a similar effect on incumbents' vote percentages as estimated in the previous tables.

While there is the concern that challenger advertising is endogenous if the challenger quality variable does not capture all relevant dimensions of challenger ability, there is also the concern that both the incumbent and challenger advertising variables contain measurement error because not all of total campaign spending is spent on television spots. One way of addressing the measurement error is to use instruments for both incumbent and challenger advertising. Because both variables are measured with error, OLS leads to an attenuation bias. To perform instrumental variable estimation, when both incumbent and challenger advertising are endogenous and are measured with error, instruments are required that can separately identify challenger and incumbent advertising. In this data set, square miles in a congressional district are more strongly correlated with incumbent advertising than with challenger advertising, although both correlations are statistically significant. Thus, I will continue to use media advertising costs to identify incumbent advertising, and chose a different instrument for challenger advertising.

Classical work on measurement error by Wald (1940) has shown that the creation of an artificial instrument can lead to unbiased estimates. More recently the correctness of this measure has been shown by Koenker and Bassett (1978). To identify challenger advertising, I therefore create an indicator variable that equals one for challengers with more advertising than the median challenger advertising and that equals zero otherwise. Given that the instrument for challenger advertising is defined by whether challenger advertising is above or below the median challenger expenditure, it is correlated with challenger advertising, and thus fulfills one of the conditions for the validity of instruments. Wald (1940) and Koenker and Bassett (1978) show that this

instrument is also independent of the disturbance term in the second stage, thus fulfilling the second condition for a valid instrument.

Table 5 shows the effects of campaign advertisement after addressing measurement error and endogeneity issues. The first stage (not reported) shows that the square miles in a congressional district continues to have a statistically significant impact with incumbent advertising and that the indicator variable is significantly correlated with challenger advertising. The second stage estimates show that, as anticipated, the magnitude of the estimated coefficients on advertisements increased. Campaign advertising has a quantitative important effect on votes shares, in addition to having a qualitatively important effect. A 1,000 unit increase in advertising increases the incumbents' vote share by 0.9 percentage points and challengers' vote shares by 3.4 percentage points. (Table 5, column 1). The difference between these point estimates is statistically significant.

Lesser known candidates are incumbents with a short length of service in Congress and challengers who have less name recognition than other challengers. The hypothesis that campaign advertising messages and not campaign spending is important for increasing vote shares implies that advertising is most productive for those candidates who are relatively unknown to the electorate.

To test for this implication I create an indicator variable defined to equal one if the incumbent has served one term in Congress and zero otherwise, and I include this variable and an interaction of this variable with incumbent campaign advertisement in the regression equation. Next, I define an indicator variable equaling one if the challenger has not held public office and zero otherwise, and include this variable and the interaction of this variable with challenger

advertisements in the regression equation. The hypothesis that advertisements is relatively more productive for unknown candidates implies that the incumbent interaction advertising effect is positive and that the challenger interaction effect is negative.

Table 6 presents the results from this test. To save space, I only report the specifications where campaign spending and advertisements are measured in logs. Similar results as those reported in Table 6 are obtained when examining levels or the square root of campaign activities. Column 1 provides OLS results when campaign spending is examined and the other columns 2 and 3 present OLS and 2SLS results when television advertising is examined. In addition to an indicator for freshmen incumbents, all regressions include the same control variables as the previous regressions, including an indicator for unknown challengers.

To obtain the effectiveness of spending for relatively unknown candidates, one has to add the coefficients on candidate spending and the interaction effect. The results on campaign spending show that campaign spending has a negative effect for senior incumbents and an even larger negative and statistically significant effect for junior incumbents. For challengers, the effect of campaign spending does not differ between known challengers and unknown challengers. Thus, there is no evidence that campaign spending is more productive for unknown candidates.

However, there is evidence that campaign advertisements, as opposed to spending, from unknown candidates is more effective than advertisements from known candidates. This is the case regardless whether or not the regression equation is estimated with OLS or 2SLS. The two-stage least square estimates suggest that a one percent increase in advertising increases the vote for senior incumbents by 0.06 percentage points and for freshmen incumbents by 0.1 percentage

point (Table 6, column 3).⁸ The unreported results from the linear specifications show that a 1,000 unit increase in advertising by incumbent freshmen leads to a 1.2 percentage point increase in their vote percentage. The results in Table 6 also show that the productivity of advertising is higher for unknown challengers. In the 2SLS specification the increase in advertising productivity for unknown challengers is less than the productivity increase for freshmen incumbents (Table 6, columns 2, 3 and 6). This finding suggests that the name recognition difference between a challenger who has not held public office and a challenger who has held public office is smaller than the name recognition difference of a freshman incumbent and an incumbent who has served many years in Congress.

VII. Results from the 1990 election

This section of the paper examines whether the previously used measure of campaign advertising is a reasonable measure for the true number of advertisements. Data from 1990 election allows us a unique opportunity to examine this question because data on media advertisements as a fraction of total campaign spending exists for this election.⁹ Means of standard deviations of variables used in this analysis are in the appendix Table A2.

⁸I also interacted the incumbent advertising variable with the log of incumbent seniority and the results continued to show that the productivity of incumbent advertising significantly declines with increasing name recognition.

⁹As noted previously, these data are also available for the 1992 election. I chose not to examine these data since, due to redistricting, over eighty percent of the incumbents faced ran in districts with different geographic boundaries than those in which they ran in previously, than those they ran in previously redistricting. This means that their advertising messages have a differential impact on voters, depending on whether the incumbent faced name recognition or not. Thus the 1990 election data are most comparable to the 1996 to 2000 data analyzed since no redistricting occurred in those years.

The table with descriptive statistics shows that incumbents spend 24 percent of total spending on media advertising, and that challengers spend 31 percent (Table Appendix A2). As noted previously, the correlation coefficient between total campaign expenditures and media advertising expenditures is 0.87 for challengers and 0.73 for incumbents. To develop an advertising measure that reflects the price of advertising in a district, I divide both total campaign expenditures and advertising expenditures by the television cost per point rating in 1990. These resulting ratios are highly correlated. The correlation coefficient between the advertisements measures based on total expenditures and the measure based on advertising expenditures is 0.95 for challengers and 0.93 for incumbents. I also created a number of advertisement measure based on total communication spending. Total communications spending includes media advertising as well as expenses for mailings and door to door campaigning.

For the 1990 regression I estimate the regression using these three different campaign spending measure. If media advertising is most the most productive form of advertising, then the point estimates on media advertising is predicted to be larger than the point estimates on overall spending and total communications spending.

Table 7 Panel A shows the results based total campaign spending, Table 7, Panel B shows the results based on total communications spending, and Panel C shows the results based on media advertising only. The first two column show the OLS results for the linear and log specifications. To economize on space I do not report the square root specifications, and the results from these specifications are similar to those reported in Table 7. The next two columns present estimates where there instrument for incumbent advertising is the square miles in a congressional district. The last two columns instrument for challenger advertising in addition to

incumbent advertising.

The magnitude of the 1990 IV estimates using overall spending are comparable to the previous 1996-2000 estimates which also use overall spending. Thus the 1990 overall spending results provide a useful benchmark against which to evaluate estimates that are based on communication and media advertising.

The overall pattern in this table shows that for each category of spending, the point estimates are getting larger the more fully incumbent and challenger advertising are instrumented. This is consistent with the results for the 1996 to 2000 elections. Further, the magnitude of the advertising coefficients progressively increase when moving from overall spending to communications spending, and from communications to media advertising spending. For example, the point estimates on advertising in Table 7, column 5 grows from 1.6 when the advertising measure is based on overall spending, to 2.6 when based on communications spending, and to 3.1 when based on media spending. The fact that the 2SLS coefficients on media advertising are larger than those on communications suggests that the largest productivity of spending comes from media advertising. The mean number of advertisements for incumbents, calculated off media advertising expenditure is 1,500 for incumbents and 600 for challengers. Table 7, column 5 suggests that a 1,000 unit increase in media advertising increases incumbents' vote shares by 3.1 percentage points and challengers' vote shares by over six percentage points.

The 1990, media advertising expenditure is negatively correlated with the price of television advertising, while other forms of advertising (door-to-door campaigning, mailings) is positively correlated with the price of media advertising. This suggests that candidates who face

high media cost districts substitute from media advertising to other forms of advertising.

However, the point estimates in Table 7 suggest that other forms of advertising may be less productive than media advertising.

VIII. Conclusions

This paper emphasizes the importance of advertising prices for the analysis of campaign spending. Estimates that do not account for the price of media advertising show that incumbent campaign spending has a negative effect on their votes shares. This puzzle is resolved when recognizing that the price of advertising is not equal across districts. Once accounting for the wide variation in media prices, the results show that incumbent advertising has a positive marginal product, even when not addressing the possibility that the estimate may be biased downward because of omitted variables.

After addressing the omitted variable bias, the magnitude of the incumbents' marginal product of spending increases, so that a ten percent increase in advertising increases incumbents' vote share by up to one percentage point and by up to 1.5 percentage points for challengers (Table 7, Panel C, column 6). Further, the results are consistent with the hypothesis that media advertising is the most productive category of campaign spending.

That the challengers' marginal product of spending is larger than that of incumbents is consistent with the hypothesis that advertising is more productive for unknown candidates. The estimates show that an advertisement by a freshman incumbent has a higher marginal product than that of a more senior incumbent. Similarly, challengers who are unknown because they have not run for a lower level public office prior to running in a congressional race gain more

from advertisements than those challengers who may be better known to the electorate because they have run a campaign before.

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Table 1
Summary Statistics

	Mean (Standard Deviation)
Percent of popular vote obtained by the Incumbent	64.22 (9.77)
Incumbent spending	8.024 (6.326)
Challenger spending	2.783 (4.729)
Incumbent is a Republican=1, 0 otherwise	0.521 (0.500)
Incumbent's percent of popular vote in the previous election	65.421 (13.37)
Challenger held elected office = 1, 0 otherwise	0.215 (0.411)
Incumbent's seniority, measured as the number of 2-year electoral cycles the incumbent has been a member of the House.	4.756 (3.977)
Cost of radio advertising, in thousands of dollars (in year 2000 dollars)	0.126 (0.163)
Cost of television advertising, in thousands of dollars (in year 2000 dollars)	0.419 (0.491)
Number of incumbent television advertisements	6.610 (9.147)
Number of challenger television advertisements	2.246 (4.836)
Square miles in a congressional district, in thousands of square miles	8.210 (33.80)
N	934

Notes: Campaign expenditures measured in 100,000 of dollars in real 2000 dollars. Data are for races to the U.S. House of Representatives, 1996, 1998, and 2000.

Table 2
The Productivity of Campaign Spending
Robust Standard Errors in Parentheses below Coefficient Estimates

Dependent variable: Incumbent Percent of Popular Vote			
	(i) linear	(ii) log	(iii) square root
Incumbent spending	-0.002 (0.056)	-0.830 (0.372)	0.015 (0.314)
Challenger spending	-0.690 (0.096)	-2.760 (0.149)	-4.204 (0.280)
Republican=1, 0 otherwise	-4.241 (0.405)	-3.927 (0.352)	-4.144 (0.370)
Incumbent's percent of vote in the previous election	0.368 (0.025)	0.261 (0.020)	0.295 (0.022)
Challenger held elected office = 1, 0 otherwise	-2.392 (0.486)	-0.789 (0.409)	-1.159 (0.432)
Incumbent's seniority	-0.333 (0.268)	-0.300 (0.226)	-0.477 (0.242)
Indicators for election cycles	YES	YES	YES
R-squared	0.62	0.72	0.68

Notes: N=984. The dependent variable is the incumbent's percent in the popular vote to the U.S. House of Representatives in the 1996, 1998, and 2000 general elections. Incumbent and challenger expenditures are measured in 100,000 of (real 2000) dollars.

Table 3
The Productivity of Television Campaign Advertisements: OLS Estimates
Robust Standard Errors in Parentheses below Coefficient Estimates

Dependent variable: Incumbent Percent of Popular Vote			
	(i) linear	(ii) log	(iii) square root
Incumbent advertising units	0.139 (0.032)	1.142 (0.297)	1.042 (0.218)
Challenger advertising units	-0.592 (0.072)	-4.728 (0.356)	-4.023 (0.352)
Republican=1, 0 otherwise	-4.681 (0.430)	-4.467 (0.399)	-4.642 (0.415)
Incumbent's percent of popular vote in the previous election	0.410 (0.025)	0.364 (0.024)	0.387 (0.024)
Challenger held elected office = 1, 0 otherwise	-3.103 (0.521)	-2.120 (0.048)	-2.585 (0.496)
Incumbent's seniority	-0.065 (0.277)	-0.274 (0.265)	-0.192 (0.271)
Indicators for election cycles	YES	YES	YES
R-squared	0.57	0.62	0.59

Notes: N=984. The dependent variable is the incumbent's percent in the popular vote to the U.S. House of Representatives in the 1996, 1998, and 2000 general elections.

Table 4
The Productivity of Television Campaign Advertisements: Two-Stage Least Squares Estimates
Instrumenting for endogenous incumbent advertising
Robust Standard Errors in Parentheses below Coefficient Estimates

Dependent variable: Incumbent Percent of Popular Vote			
Instruments: square miles in a congressional district			
	(i)	(ii)	(iii)
	linear	log	square root
Incumbent advertising units	0.286 (0.068)	5.609 (1.781)	2.971 (0.836)
Challenger advertising units	-0.788 (0.115)	-8.191 (1.405)	-6.012 (0.911)
Republican=1, 0 otherwise	-5.073 (0.467)	-5.833 (0.697)	-5.423 (0.541)
Incumbent's percent of popular vote in the previous election	0.409 (0.025)	0.356 (0.027)	0.382 (0.025)
Challenger held elected office = 1, 0 otherwise	-3.028 (0.524)	-1.665 (0.524)	-2.360 (0.504)
Incumbent's seniority	-0.058 (0.281)	-0.243 (0.295)	-0.141 (0.283)
Indicators for election cycles	YES	YES	YES

Notes: N=984. The dependent variable is the incumbent's percent in the popular vote to the U.S. House of Representatives in the 1996, 1998, and 2000 general elections.

Table 5
The Productivity of Television Campaign Advertisements: Two-Stage Least Squares Estimates
Instrumenting for endogenous incumbent and challenger advertising
Robust Standard Errors in Parentheses below Coefficient Estimates

Dependent variable: Incumbent Percent of Popular Vote			
Instruments: square miles in a congressional district			
	(i)	(ii)	(iii)
	linear	log	square root
Incumbent advertising units	0.928 (0.459)	7.786 (3.133)	5.875 (2.607)
Challenger advertising units	-3.358 (0.848)	-12.562 (2.802)	-14.147 (3.343)
Republican=1, 0 otherwise	-6.211 (1.214)	-6.269 (1.027)	-6.202 (1.084)
Incumbent's percent of popular vote in the previous election	0.254 (0.039)	0.295 (0.031)	0.275 (0.034)
Challenger held elected office = 1, 0 otherwise	0.586 (1.375)	-0.244 (0.785)	0.152 (0.978)
Incumbent's seniority	-0.517 (0.496)	-0.456 (0.340)	-0.490 (0.379)
Indicators for election cycles	YES	YES	YES

Notes: N=984. The dependent variable is the incumbent's percent in the popular vote to the U.S. House of Representatives in the 1996, 1998, and 2000 general elections.

Table 6
The Productivity of Television Campaign Advertisements: Two-Stage Least Squares Estimates
Robust Standard Errors in Parentheses below Coefficient Estimates

Dependent variable: Incumbent Percent of Popular Vote
Instruments: square miles in a congressional district

	(i) log spending OLS	(ii) log TV advertising OLS	(iii) log TV advertising 2SLS
Incumbents	-0.608 (0.361)	0.818 (0.296)	5.995 (2.394)
Freshmen incumbents	-2.852 (0.988)	2.050 (0.585)	3.850 (1.826)
Challengers	-2.662 (0.286)	-3.541 (0.509)	-9.239 (2.065)
Unknown challengers	-0.060 (0.276)	-1.935 (0.508)	-2.613 (0.968)
Covariates as in Table 3?	YES	YES	YES
Indicators for election cycles	YES	YES	YES

Notes: N=984. The dependent variable is the incumbent's percent in the popular vote to the U.S. House of Representatives in the 1996, 1998, and 2000 general elections. All regressions include covariates used in Table 3 and log seniority was substituted for an indicator variable for whether the incumbent was a freshman. The sample includes 178 incumbent freshmen. The 2SLS estimates instrument for endogenous incumbent and challenger advertising, as in Table 5.

Table 7
The Productivity of Advertising and Media Advertising in the 1990 Election
Robust Standard Errors in Parentheses below Coefficient Estimates

Dependent variable: Incumbent Percent of Popular Vote						
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
	linear	log	linear	log	linear	log
	OLS	OLS	2SLS	2SLS	2SLS	2SLS
Panel A						
Incumbent advertising	0.199 (0.093)	2.022 (0.697)	0.476 (0.260)	5.535 (2.378)	1.587 (0.793)	7.440 (2.985)
Challenger advertising	-0.511 (0.164)	-4.158 (0.809)	-0.820 (0.327)	-6.515 (1.799)	-4.300 (1.916)	-9.936 (2.981)
Panel B						
Incumbent communications	0.102 (0.169)	1.416 (0.876)	1.087 (0.523)	6.356 (1.865)	2.612 (1.821)	8.027 (2.782)
Challenger communications	-0.507 (0.278)	-4.444 (1.184)	-1.441 (0.582)	-8.273 (1.858)	-5.171 (2.692)	-11.80 (3.454)
Panel C						
Incumbent media advertising	0.200 (0.241)	1.885 (0.937)	1.317 (0.596)	6.490 (1.999)	3.086 (1.931)	9.148 (3.602)
Challenger media advertising	-0.778 (0.361)	-5.135 (1.351)	-1.882 (0.666)	-9.047 (2.179)	-6.712 (3.239)	-15.107 (4.914)

Notes: N=273. The dependent variable is the incumbent's percent in the popular vote to the U.S. House of Representatives in the 1990 general elections. All estimates have the same control variables as in Table 3. Columns 3 and 4 instrument for incumbent spending, and the last two columns instrument for incumbent and challenger spending.

Table A1
 First Stage Regressions
 Robust Standard Errors in Parentheses below Coefficient Estimates

Dependent variable: Incumbent campaign advertising			
	(i) linear	(ii) log	(iii) square root
District square miles	0.0798 (0.0057)	0.0042 (0.0006)	0.0081 (0.0008)
Covariates as in Table 3?	YES	YES	YES
Indicators for election cycles	YES	YES	YES
R-squared	0.59	0.52	0.57

Notes: N=984. The dependent variable is campaign advertising by incumbents of the U.S. House of Representatives in the 1996, 1998, and 2000 general elections.

Table A2
Summary Statistics for the 1990 race

	Mean (Standard Deviation)
Percent of popular vote obtained by the Incumbent	62.89 (9.14)
Incumbent spending	5.589 (3.358)
Challenger spending	1.501 (2.549)
Incumbent communication spending	2.323 (2.126)
Challenger communication spending	0.868 (1.634)
Incumbent media advertising spending	1.348 (1.515)
Challenger media advertising spending	0.467 (1.113)
Incumbent is a Republican=1, 0 ow.	0.396 (0.490)
Incumbent's percent of popular vote in the previous election	67.087 (8.847)
Challenger held elected office = 1, 0 otherwise	0.139 (0.347)
Incumbent's seniority, measured as the number of 2-year electoral cycles the incumbent has been a member of the House.	4.740 (3.491)
Cost of television advertising, in thousands of dollars (in year 2000 dollars)	0.296 (0.302)
Number of incumbent advertisements (based on total spending)	5.059 (6.694)
Number of challenger advertisements (based on total spending)	1.563 (3.838)
Square miles in a congressional district, in thousands of square miles	6.589 (14.00)
N	273

Notes: Campaign expenditures are measured in 100,000 of dollars in real 2000 dollars.