The Money Primary: Political Prediction Markets, Campaign Contributions, and Expenditures

by

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Class of 2008

A thesis submitted to the faculty of Wesleyan University in partial fulfillment of the requirements for the Degree of Bachelor of Arts with Departmental Honors in Economics

Middletown, Connecticut April, 2008
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Abstract

This thesis investigates the dynamic relationship between the probability of victory, campaign contributions, and campaign expenditures in presidential nomination campaigns. To do so, we make use of a novel dataset of contributions by individuals to campaigns, campaign expenditures, and political prediction market data on nomination probabilities. While electoral expectations do not affect fundraising of front-runner campaigns, successful insurgent campaigns do have significant elasticity of funds with respect to nomination probabilities. Contributions from political and financial home bases are more elastic than contributions from outside these areas. Front-runner funds do depend on the leading candidate retaining the electoral advantage. Campaign expenditures have a very small but significant effect on the probability of victory and other fixed, candidate-specific factors have a much larger effect. Reports about fundraising results do not significantly affect nomination probabilities. There is evidence of a feedback mechanism between electoral expectations and fundraising for successful insurgents but not for failed long-shots or front-runners. Finally, the *ex ante* determination of candidates as frontrunners or long-shots, though difficult to explain, determines much of the nomination process.
Acknowledgements

First and foremost, I owe a special debt of gratitude to my advisor, Professor Cameron Shelton. I have benefited from his guidance, invaluable suggestions, and support throughout this project.

Many faculty members of Economics Department at Wesleyan offered helpful comments and posed insightful questions when I presented my prospectus in December. Throughout my years at Wesleyan, I have profited from the intellectual rigor and collegial atmosphere in the department. As is the tradition, I may end up being trained elsewhere, but I will always be proud to have been educated at Wesleyan.

Manolis Kaparakis was an incredible resource of statistical, empirical, and life knowledge. I could not have managed such a data-intensive thesis without his help. Henk Meij offered substantial data and coding support, writing scripts in SAS and Perl that saved me time and heartache. Steve Bischoff kindly took the time to help me produce the GIS maps in the second empirical chapter and appendix.

Finally, I thank my tireless proof reader, my brilliant random-question-answerer, and my best friend, Alexandra Steinlight.

J.J.F.
April 2008
Middletown, CT
Introduction

The Huckabee Paradox

In the popular press, the role of money in politics is consistently portrayed as a vicious cycle. Candidates need to raise money to prove they are serious and they need to be serious candidates to raise money. In September 2007, Newsweek reported that former Arkansas Governor and Republican presidential candidate Mike Huckabee seemed to be the perfect candidate for the GOP base. However, the article continued, “Huckabee is stuck in a familiar political trap: is he having trouble raising money because no one thinks he can win, or does no one think he can win because he’s having trouble raising money?”1

The academic literature on campaign finance struggles with these same questions. Do campaign contributions and expenditures drive voters’ perceptions of candidate quality and, thereby, voting results, or do electoral conditions determine how much money campaigns raise and spend? This simultaneity problem clouds much of the research on the “productivity” of campaign expenditures. The dominant result in that literature dates to Jacobson (1978) and states that while incumbent spending is statistically insignificant, challenger spending positively affects challenger vote share. Yet, as Jacobson and others have noted, both incumbents and challengers spend

a great deal of time soliciting funds. Subsequent work has been devoted to explaining these curious results, using various instruments and estimation assumptions to manage the endogeneity and produce valid estimates of the productivity of campaign spending. However, without fully understanding the simultaneous relationship between money and votes, strong conclusions have been elusive.

This thesis investigates the dynamic relationship between campaign contributions, expenditures, and the probability of victory in presidential nomination campaigns. To do so, we make use of a high-frequency dataset measuring individuals’ contributions to campaigns, campaign expenditures, and the probability of winning the nomination, assessed by political prediction markets. We will analyze this simultaneous system to uncover the effect of contributions and expenditures on the probability of victory and the effect of expected election results on contribution decisions. Our sample includes presidential nomination contests from 1992 to 2004 plus partial data for 2008. With this data, changes in electoral conditions are much clearer: the prediction markets are efficient and accurate. What’s more, we can evaluate campaign contribution and expenditure decisions in the context of current expectations about nomination probabilities. In addition, we are able to study changes in expectations based on contribution reports and expenditures. The longitudinal dataset also allows us to control for unobserved heterogeneity between candidates and to produce unbiased estimations of the effect of campaign spending on electoral conditions, previously not possible in the static cross-sectional literature.

We find that electoral expectations do not affect the fundraising of front-runner campaigns. For some long-shot campaigns, however, we find that their

\[ \text{The specific races are the Democratic nominations in 2000 and 2004 and the Republican nominations in 1996 and 2000.} \]
contributions do increase with increases in their probability of nomination. These campaigns tend to be the most successful insurgent campaigns as they are able to win a few primaries or seriously challenge the leader but not ultimately win the nomination. For successful insurgents, the effects are magnified by contributions from political and financial home bases and dulled by contributors from outside these areas. The fundraising of front-runner campaigns does respond, in small magnitude, to the overall political conditions, such as the probability the candidate’s party wins the White House or the Senate. In addition, front-runner finances are extremely dependent on their status as front-runners; a serious threat to this role from a potential (undeclared) candidate has a significantly negative effect on front-runner contributions, while having no effect on other candidates’ contributions.

Our findings suggest that campaign expenditures are not very productive: they have a statistically significant but very small positive effect on the probability of victory during the campaigns. The unobserved heterogeneity between candidates, such as campaigning quality or political positions, explains the majority of the difference in electoral expectations. We also find that reports about fundraising results do not significantly affect nomination probabilities. Finally, there is evidence of a feedback mechanism between electoral expectations and fundraising for successful insurgents, but not for failed long-shots or front-runners.

The results of this thesis underscore the importance of the *ex ante* determination of front-runners and long-shot campaigns. While some long-shot candidates are able to tap into a fundraising and expectation feedback mechanism and pose a serious challenge to the front-runner, none of these candidates are ultimately successful. Instead, these races are determined well before either the voting primaries or even the so-called “money primary”
taking place the year before the general election. If this is the case, we may have
to question seriously the democratic legitimacy of the party primary system.
The will of the people, as expressed in the voting results in primaries and
caucuses from January to June of the election year, may have no role in choosing
presidential nominees. How then, could we expect that elected leaders are
chosen in a socially efficient way?

The thesis proceeds as follows. We begin with a discussion of political
general equilibrium amongst voters, candidates, and interests groups: the
role of campaign spending, motives for contributing, and the inefficiency
of elections. We then briefly summarize the history of campaign finance
legislation in the United States, specifically legislation regarding contributions
and expenditures in presidential nomination campaigns and the FEC reporting
rules. Then, we describe our novel dataset of contributions, expenditures,
and prediction market prices. We discuss the relevant literature on campaign
expenditures, contribution decisions, and nomination campaigns. The first
empirical chapter investigates the determinants of fundraising flows and
presents an event study of electoral shocks and their impact on contributions.
The second empirical chapter divides contributions into financial base and non-
base and reexamines the differential responses of these two funding sources
to electoral conditions. The third empirical chapter tests the response of the
prediction markets to the release of FEC reports and to campaign expenditures.
The final empirical chapter puts the models together, estimating a two equation
vector autoregressive model of contributions and probability of victory.
CHAPTER 1

Money in Politics: An Overview

1.1 The Electoral General Equilibrium Model

Campaigns are idealized as sorting mechanisms in formal models of politics. In this electoral general equilibrium, voters evaluate candidates on two axes: policy and valence. Policy is the collection of political positions and ideological beliefs held by a candidate. In the formal models, voters measure this quality as the distance between the ideology of the individual voter and of the candidate. Valence is the non-ideological quality of a candidate: for example, managerial skill, political creativity, charisma, reputation, or even physical attractiveness (Coate 2004a). According to Mueller (2003), “all citizens prefer honest politicians to crooks [and] competent politicians to buffoons.” In theory, all voters would prefer a candidate with high valence, as these qualities make for good elected officials—regardless of ideological orientation. Ceteris paribus, voters would like to elect highly competent candidates who share their ideological positions. However, citizens can only observe a noisy signal of valence and policy. Campaign spending can reduce (but not eliminate) the

1 If policies are one dimensional and easily mapped to a real number line (for example, if the only policy is the rate of taxation or level of government spending), this is straightforward. If voters care about a number of policies, but they are still cardinal, the extension is clear.
We assume that candidates have fixed policy positions and thus cannot be influenced to change positions once they become a candidate for public office. This is referred to as the “political man” theory or “citizen-candidate” model, according to which contributors are passive consumers of candidates’ fixed positions (Welch 1976; Besley and Coate 1997). Because voters observe only noisy signals of candidate qualities, candidates can spend money in an effort to increase their chances of election. In general, the campaign finance literature suggests three possible ways in which campaign spending influences electoral results. First, informative campaigning signals to voters about the policy positions of candidates (Coate 2004a). Second, persuasive campaigning may serve to convince voters about valence, but voters may never necessarily know the true values (Mueller and Stratmann 1994). Finally, campaigning may serve to reduce the uncertainty about positions (Austen-Smith 1987). Further assumptions about the public (for example the ratio of informed to uninformed voters or the relative preferences for valence or policies) are necessary to derive optimal candidate strategies and the effects of campaign finance regulations. But in all cases it is possible that the winning candidate may not have been elected under perfect information conditions.

In simple two-candidate competition with perfect and complete informa-

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2 It is important to note that the campaign finance literature labels all campaign spending as advertisements. While much of campaign spending does finance ads, it also supports other campaigning activities such as candidate travel, staffing, organization, and infrastructure. Directly or indirectly, spending on these types of activities may influence electoral results through one of the three mechanisms.

3 Of course, we assume valence is fixed as well.

4 Welch (1976) also allows for contributors to change candidate positions; this quid pro quo system is known as “economic man” theory.

5 There is some debate in the literature as to whether candidates seek to maximize vote share (Coate 2004a,b) or probability of victory (Prat 2002). For the motivation for this thesis, however, the two aims are the same. For a different take, Glazer and Gradstein (2005) assume that candidates seek to maximize contributions.
tion (and only one dimension, either valence or policy), the median voter
determines the winner: the candidate whose policy location maximizes the
utility function of the median voter will receive at least one more than half
of the votes and win the election. Moreover, there will be no campaign
spending because it serves no purpose. Voters can already perfectly observe
the candidates’ policies and valence. Extensions to \( n \)-dimensional policy spaces
with a valence component (or with \( m \)-candidates) may complicate these results,
as it may not be possible to identify the median voter.\(^6\) However, with
complete and perfect information, no candidates have incentives to advertise
and the majority voting rule “works” in some sense of democratic principles.
As we assume that candidates have fixed policy positions (and thus cannot
be influenced to change positions by contributions), there will not be any
contributions, as there is neither demand for contributions by candidates nor
is there an incentive for individuals (or groups) to donate. Thus, with perfect
information, there is no money in politics.

However, if voters lack perfect knowledge of valence or policies (or both),
then campaign spending plays a key role in the electoral general equilibrium.
Money overcomes the informational asymmetries through one (or more) of
the three channels discussed above. Candidates can potentially increase their
chance of winning an election through campaign spending. Recognizing this
fact, candidates will try to solicit campaign contributions. Those who are able
to do so most effectively will be more likely to win.

From a public choice perspective, the central trade-off of these models
is that the benefits of campaign spending, namely the increase in voters’
knowledge about candidates, have to be weighed against the potential policy

\(^6\) Cooper and Munger (2000) suggest via simulation evidence that even under very simple
assumptions about voter utility functions and probabilistic party affiliation, primary and
general election outcomes are extremely unstable. However, given initial scenario, the
candidate nominated by each party is preferred by a majority of the party.
bias of campaign contributions from a minority interest group. There may be candidates who would not be elected under perfect information but who are preferred by interest groups. These interest groups could be any minority group of voters with the financial means to make large contributions. We assume that these interest groups, with non-representative policy preferences, understand that through some channel their contributions to their preferred candidate would influence the electoral results. Assuming that the costs of donating are small relative to the benefits of the election of their preferred candidate, we would expect these groups to contribute to their preferred candidates. As the benefits are in expectations, increases to the likelihood of election should increase the expected value of the benefits. In this way, contributions are influenced by a candidate’s probability of victory. Especially when there are many candidates to choose from (for example, a primary), the effect of the probability of victory may be fundamental to the contribution decisions of interest groups with finite resources.

The contributions of these interest groups could lead to a public choice inefficiency. The democratic process is built on the fundamental principle of “one person, one vote” but some candidates are elected because of the influence of special interest groups through contributions. Some theoretical models even suggest that this choice could lead to poor policies and economic

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7 On the extreme end, these interest groups could include only the candidate. Without limits on contributions (or the contributions of an individual to his own campaign), billionaire candidates could self-finance campaigns and, through limitless campaign spending, essentially purchase elections. In fact, the election of self-financed and wealthy candidates has occurred frequently in recent years. Examples include Michael Bloomberg’s mayoral election in New York City and John Corzine’s election first as senator and then as governor in New Jersey. In the race for the presidency, Steve Forbes self-financed campaigns in 1996 and 2000 for the Republican nomination, and in 2008 Mitt Romney, despite little financial support from outside contributors, was able to tap into his vast personal fortune to continue his campaign.

8 This is not to suggest that campaign spending is always bad for social welfare or public choice. Coate (2004b) presents one such model, where interest groups are better at identifying valence and thus campaign spending is a valid signal of valence.
inefficiency (Lohmann 1998). One obvious solution to the public choice inefficiency would be mandating equal funds for campaigns to spend. Ignoring the legal issues, the clear problem here is that such a system could invite such an overload of candidates that voters may receive even noisier signals than before.\(^9\) Eliminating campaign spending altogether would leave democratic results subject to the original noisy signals about policy and valence. Clearly, there is some role for campaign spending and even for the market place of contributions to play, perhaps in winnowing the field to relevant candidates; the question is what is the optimal level of money that would allow the voting public to benefit from the increased information without biasing their election choices in the favor of moneyed interest groups.

When we extend this electoral general equilibrium into a dynamic framework, the inefficiencies and electoral bias caused by money could grow worse. Elections and campaigns take place over the course of many months. Interest groups (and other contributors) can make decisions to contribute at any point during the campaign. Voters (through polls and other means) can signal their favored candidate during the campaign, but they are not forced to choose a candidate until they vote on election day. If we assume that fundraising is not perfectly correlated with valence and voters are influenced by campaign spending, then candidates may not be chosen for their quality or political positions (or at least they may not be chosen “efficiently” from a public choice perspective).

Interest groups could use donations early in the process to fuel the election of candidates who match their ideological positions, but not those of the majority of voters. The candidates could spend this early money on campaign advertising or operations that could increase their popularity (the percent

\[9\] The Supreme Court ruled in *Buckley v. Valeo* that political contributions are protected speech. Outlawing people from making contributions would be unconstitutional.
the population intending to vote for a certain candidate because these voters believe that the candidate maximizes their voter utility based on available information). If we assume that popularity encourages campaign contributions (the expected value to a voter of a certain candidate is higher when the candidate has a better chance of winning), then these interest group candidates would be both well-financed and supported. Similarly, if contributions are influenced by “electability,” a one-time shock to popularity could lead to a wave of contributions from individuals or interest groups, which would feed into campaign spending. This spending would then lead to more contributions. The original popularity shock, through the feedback between fundraising, expenditures, and probability of victory, could even decide elections.

It is clear that it would be impossible to regulate or defend the institution at the core of democracy without a full understanding of the internal dynamics of the relationship between contributions, spending, and the probability of victory. In this model of interest group campaign contributions, economic inequality becomes political inequality and public choice inefficiency. Thus, we seek to gain a better empirical understanding of the electoral general equilibrium in the presidential nomination process.

1.2 A Brief History of Campaign Finance Laws

Legislation in America regarding the role of money in the political process predates the nation itself. In 1699 members of the Virginia House of Burgesses enacted a prohibition on the bribery of voters in elections. It is clear that worries about the corruption of the democratic process are nothing new; however, as Mutch (2001) argues, “There has always been money in elections, but it hasn’t always played the same role.” Citing the 1699 Virginia law, Mutch notes that this law was written to prevent the candidates themselves from
purchasing elections by paying off voters rather than to address fears about interested money’s corrupting role in politics. However, Corrado (2005) argues that “money’s influence on the political process has long been a concern;” fundamentally there is disagreement between laws seeking to protect the ideal of “one person, one vote” without diminishing “fundamental political liberties, such as the freedoms of speech and political association.” Statutes like the 1699 Virginia bribery law were the main source of campaign finance legislation during the colonial period and the early years of the American republic. Most candidates for office were wealthy and self-financed, and thus the only way money could have corrupted the political process would have been through bribery of voters by candidates.

It was not until the early nineteenth century that contributions to candidates began—and not until 1867 that they were limited. In that year, a Naval Appropriation Bill restricted Navy workers from contributing to federal campaigns. In 1883, Congress extended the prohibition to all federal civil service workers in the Pendleton Civil Service Act. These bills arose as attempts to limit the party spoils and assessment system; party loyalists were placed in government jobs and then required to pay a percentage of their income to the party coffers in return. The bans on assessments accomplished their major goal of ending the party spoils system—federal employees were no longer the main source of campaign contributions. However, this congressional legislation did not reduce the amount of money in politics. Rather, it forced politicians to raise money from different sources. Primarily these sources were “industrial giants in oil, railroads, steel, and finance, which held major stakes in the direction of government policy,” all of whom made donations of $50,000

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10 The act also attacked the party spoils system by requiring federal employes to qualify for office through examinations (Corrado 2005).
or more (Corrado 2005).\footnote{That is more than $1 million per company in 2008 dollars.}

Though progressive politicians and journalists feared the new era of corporate sponsorship of campaigns, reforms failed to gain traction in Congress until numerous scandals emerged from Theodore Roosevelt’s reelection campaign in 1904. Stories included Roosevelt blackmailing monopolies and providing special privileges to the wealthiest Americans, all to secure funds for his campaign. Though Roosevelt proclaimed his innocence, investigations following the election revealed a number of direct contributions from corporations to the Republican Party and Roosevelt’s campaign. While these contributions were legal, popular opinion about the role of corporate money in politics changed very quickly. In response, Roosevelt changed with it, calling for campaign finance reform in addresses to Congress in 1905 and 1906. In 1906, he told Congress that “All contributions by corporations to any political committee or for any political purpose should be forbidden by law” (Corrado 2005). Thanks to Roosevelt’s support and the forceful leadership of Senator Benjamin Tillman of South Carolina, Congress finally acted in 1907. The Tillman Act banned banks and corporations from donating funds to federal candidates. Reforms continued with the Publicity Act of 1910 and the Federal Corrupt Practices Act of 1925, both of which instituted reporting guidelines for all contributions and campaign expenditures. However, these laws failed to reform the system. The statutes were mostly ignored, as they “lacked the institutional and legal framework necessary to make them readily applicable and enforceable” (Aparicio-Castillo 2006). As Corrado (2005) notes, “In the history of the 1925 act, no one was prosecuted for failing to comply with the law.”

The laws also failed to impede the growth of campaign spending. More
than $300 million was spent in total on all federal elections in 1968, twice as much as had been spent in 1956. For the first time in the nation’s history, Congress enacted major campaign finance legislation with the Federal Election Campaign Act (FECA) of 1971. The act imposed limits on contributions by candidates to their own campaigns, required public disclosure of all contributions, and limited media spending by candidates. Whether it would have been successful (and what exactly its aims were) is unclear—the FECA of 1971 regulated only the 1972 campaigns. Following that election—and Watergate—Congress reworked major portions of the law. Corrado (2005) argues that “the FECA amendments of 1974 represent the most comprehensive campaign finance reform package ever adopted by Congress.”

The FECA amendments of 1974 focused on contributions from both individuals and political organizations to candidates for Congress and the presidency. The new FECA limited contributions by individuals to $1,000 per election cycle; PACs were limited to contributions of $5,000. In addition, the law strengthened the disclosure mechanism for contributions, creating the Federal Election Commission (FEC) with all the legal powers necessary to ensure candidates, contributors, and parties complied with the new law. In particular, the FEC required candidates to submit quarterly (in the year before elections) or monthly (in the election year) reports on spending and fundraising as well as detailed records of every contribution of $100 or more. The law also created spending limits for all federal campaigns. Finally, the FECA

\[\text{Corrado (2005) argues that it was this dramatic growth in expenditures that may have compelled legislators, worried about their ability to raise such extreme sums, to act.}\]

\[\text{The definition of an election, for the purpose of the law, was either a primary or a general. Contributors could, in effect, give candidates $2000—half for the primary and the other half for the general.}\]

\[\text{The one major change to the FEC’s reporting regulations brought about after the 1974 amendments was in 1979. The detailed reporting threshold for individual contributions was increased from $100 to $200 (Corrado 2005).}\]
amendments started a system of public financing for presidential elections (and public matching for primary campaigns). The law was substantially changed by the Supreme Court’s ruling in *Buckley v. Valeo* in 1976, with the limits on campaign expenditures and personal contributions by the candidates struck down as unconstitutional. However, the limits on individual and PAC contributions, the public financing, and the FEC’s legal authority to oversee the campaign finance process remained.

Aside from minor amendments and procedural changes designed to take advantage of electronic filing, Congress did not fundamentally alter campaign finance laws until the Bipartisan Campaign Reform Act of 2002 (BCRA). The law, which had been proposed by Senators John McCain (R-AZ) and Russell Feingold (D-WI) to each session of Congress since the mid-1990s, principally targeted so-called “soft money” (unlimited donations to parties for “party-building”) and other loopholes of FECA. The BCRA also increased the limit on individual contributions to federal candidates to $2000 and linked it to the consumer price index to account for inflation.$^{15}$ Limits for contributions by PACs, however, were not increased or indexed. The requirement for campaigns to report detailed data on all contributions of $200 or more remained. Of principle concern here are the regulations regarding contributions that would effect the presidential nomination contests from 1992 onwards. The limits are reported in Table 1.1.

\[\text{Table 1.1  FEC Contribution Limits}\]

<table>
<thead>
<tr>
<th>Election</th>
<th>Individual Limit</th>
<th>PAC Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992 to 2000</td>
<td>$1000</td>
<td>$5000</td>
</tr>
<tr>
<td>2004</td>
<td>$2000</td>
<td>$5000</td>
</tr>
<tr>
<td>2008</td>
<td>$2300</td>
<td>$5000</td>
</tr>
</tbody>
</table>

$^{15}$BCRA also limits individuals to aggregate contributions (to candidates, parties, and PACs) of $95,000 per election cycle.
1.3 Data: Sources and Description

1.3.1 Campaign Contributions

We draw the data on campaign contributions from the Federal Elections Commission (FEC).\textsuperscript{16} The raw dataset is at the contribution level—for each contribution made by any individual or PAC to a political campaign, we have a record of the transaction date, the donor’s address and occupation, and the amount. The information is compiled by candidates and their campaigns and submitted to the FEC quarterly in the year before a general election and monthly in the year of the general election.

We have aggregated the contributions by candidate and by day so that we have contribution schedules: we are able to calculate how much each candidate raised on a given day, as well as the number of contributors, the mean, and the median contribution. In addition, we have calculated the daily amounts of “base money”—that is, contributions to candidates from their home states or other geographic or financial bases.\textsuperscript{17}

The FEC requires candidates (as well as parties and PACs) to document all donations of $200 or more. This means that donations of less than $200 are not part of our dataset. These unrecorded contributions constitute an important potential source of measurement error.\textsuperscript{18} However, only 10% to 15% of contributions to major candidates in primaries tend to be under $200. More, based on a few summary statistics, it appears these percentages are constant over time for each candidate (and roughly constant race to race). In the 1992 Democratic nomination contest, Bill Clinton raised less than 20% of

\textsuperscript{16} Data are available at http://www.fec.gov/finance/disclosure/ftpdet.shtml.
\textsuperscript{17} These base measures will be fully described in the chapters in which they are used.
\textsuperscript{18} Though unrecorded by the FEC, campaigns keep track of these smaller donations so that they can report total fundraising numbers each quarter.
his campaign funds from donations smaller than $200, and Bob Kerrey, Paul Tsongas, and Tom Harkin all raised less than half their money from these smaller donors (Brown Jr. et al. 1995). In 2000, the Democratic contenders Al Gore and Bill Bradley raised 20% and 13% of their total contributions from small donors, and the Republican winner, George Bush, raised only 14%. The Democratic race in 2004 saw an increase in small donors to the eventual winner, John Kerry (35%), but other major contenders (John Edwards, Dick Gephardt and Joe Lieberman) raised less than 14% from small donors. Despite some measurement error, it appears the contribution data we do have are an accurate representation of total contributions.

The most prominent feature in the data is a large spike on the final day of each quarter. The spike is less severe for the earlier campaigns (the Democratic nomination in 1992 or the Republican nomination in 1996) and seems to affect only the individual contributions to campaigns and not the contribution data for PACs. Discussions with political insiders have led us to a few theories about the nature of this spike and a few ways to deal with it. To begin with, campaign staffs do not specialize—the staffers making calls soliciting donations are also responsible for filing reports with the FEC. Those reports, which are due quarterly, are actually due 10 days after the end of each quarter. It seems that early in the quarter, staff workers solicit and log donations. However, as the quarter comes to a close, resources are shifted to solicitation—there is a drive to report as large a quarterly number as possible. When the quarter ends,

19 The only other major candidate in 1992 was former California Governor Jerry Brown. Brown refused to accept donations over $100 and, so, is not logged at all by the FEC (Brown Jr. et al. 1995). He is the only candidate in our sample to make this requirement of donors.

20 It is not clear whether Kerry’s spike in small donors happened during the competitive portion of the nomination contest or afterwards.

21 In a study of fundraising during the 1988 nomination races, Hinckley and Green (1996) make similar assumptions about the FEC data serving as reasonable sub-sample of the true contribution data.
resources are moved back to logging donations and campaigns may record most checks that have come in the past weeks as coming in on the final day of quarter. It has also been suggested that staff workers, during solicitation calls, stress the last day of the quarter to potential donors, which may lead donors to date their checks for this day. In the estimation of the effect of electoral conditions on campaign fundraising, we will address these contribution spikes with end of the quarter (final day, final week, etc) controls and by aggregation techniques to minimize this measurement error.

1.3.2 Campaign Expenditures

The FEC also collects budget statements from the candidates (and other political organizations) on a regular basis.\textsuperscript{22} The statements, which are reported quarterly in the year before the general election and monthly in the year of, detail campaign expenses and receipts.\textsuperscript{23} Spending is broken down into four broad categories: operating expenditures, fundraising disbursements, legal/accounting disbursements, and other expenses. The receipt information includes totals of contributions from individuals and PACs, as well as loans from the candidate, transfers from previous campaigns, and federal matching funds.

There are two main issues with this data. To begin with, the irregular releases limit its usefulness. The monthly data from the year of the general election must be aggregated to the quarterly level and, because most primary contests in our sample are decided by March or April, there are at most six

\textsuperscript{22}Data are available at \url{http://www.fec.gov/press/bkgrnd/pres_cf/pres_cf.shtml}.

\textsuperscript{23}Prior to 2000, these reports (or the portion made available from the FEC) included only measures of total spending, total receipts (the sum of all contributions and other income sources for campaigns) and cash on hand when the report was filed. For the most recent election cycles (2000 and on), the expenditure reports are more detailed. We have collected full FEC expenditure and receipt data for 2000, 2004, and 2008 and, by accessing the raw copies of filing reports from 1996, entered detailed data on that race as well.
quarterly data points per candidate. Secondly, the reporting regulations are not very strict. According to data provided to the FEC in 2004, President George Bush’s re-election campaign did not spend a single dollar on fundraising expenses, despite raising a record $258 million. Similarly, his Democratic challenger, Senator John Kerry reported spending only $1.6 million, all of that before October 2003. Instead, these campaigns and a few others reported spending the vast majority of their funds on operating expenses. While it is not clear whether this issue in the data is deliberate on the part of campaigns to avoid revealing their budget decisions or merely oversimplified accounting, it does appear to be confined to the 2004 election cycle and only certain candidates. Still, it must provoke caution about the legitimacy of this expenditure data. As a result, we use data on both operating expenditures and total expenditures in estimations of the productivity of spending. As will be seen, these measures produce similar results, which underscores the accuracy of the estimated efficiency of spending.

1.3.3 Prediction Markets

To measure the probability of victory, we are using share prices on winner-take-all contracts traded on the Iowa Electronic Market (IEM). This market, which opened in 1988 trading shares on that year’s presidential election, is a real-money futures market operated by the faculty of the University of Iowa Tippie College of Business. Traders invest $5 to $500 on various political contracts which liquidate at either a fixed sum (in winner-take-all markets) or a variable amount (for vote-share markets) following a political result. The traders are anonymous and all transactions are processed through the internet.

Though campaigns are also self-reporting the contribution data, it appears they are much more diligent in reporting truthfully. Alternatively, the FEC may just be more concerned about the accuracy of that data.
site for the IEM. Traders may either buy individual contracts at market prices from other traders or new unit portfolios from the IEM for $1. These unit portfolios contain one contract for each candidate to win a certain race (thus, the expected value of this portfolio is exactly $1). Traders then “unbundle” the contracts and can sell those at market prices (effectively allowing traders to short contracts). In addition to protecting the IEM from losses (the markets are thus zero-sum), these unit portfolios ensure that the prices of individual contracts are not affected by the volume of shares issued (Forsythe et al. 1999). The directors of the IEM make the initial decision as to which candidates are included on the markets to start and which contracts to introduce during the course of a campaign. These new contracts are spun-off of the existing rest of the field contract when a candidate (outside of the market) emerges as a plausible contender. Berg et al. (2000) explain that the IEM operates “using a continuous, double-auction trading mechanism.” Transactions are made either as market orders (immediate trades are market prices) or as limit orders (decisions to buy or sell a certain quantity at a specified price in some time period). Traders have access to historical data as well as the current best bid and ask prices and the last trade price.

There are a number of reasons why prediction market data work better than polling data for our project. To begin with, the frequency is much better. While some polls are taken daily close to election day, it would be unlikely to find such high-frequency polls more than a year before the nominating convention.

25 In this thesis, we will report quotes from the IEM in terms of prices to win $100. That is, if we write that Al Gore’s contract is trading at $75 that means it is $75 to win $100. More, the implied probability of victory is 75%.

26 The IEM does not have a specific metric for when to introduce new contracts. It is left to the discretion of the IEM directors.

27 For a more technical introduction the IEM and its market mechanism, see Berg et al. (1996), Berg et al. (1997) and Forsythe et al. (1992).
for these primaries. In addition, the “question” asked by the polls and these markets are different. As Berg et al. (2000) note, the Iowa Markets (and other electronic markets) ask traders who they think will win. Polls ask, instead, who people are going to vote for. Wolfers and Zitzewitz (2007) argue that market prices on winner take all contracts on predication markets represent probabilities of victory. Given this assumption, the prediction markets provide exactly the correct data for this project, whereas poll data would merely be an imperfect substitute. The dynamic questions we hope to answer have to do with the interaction of fundraising and expectations about victory during the course of the campaigns; prediction market data throughout the period measure those expectations.

Finally, the prediction markets are more accurate that polls. In elections held between 1988 and 2000, the average market error was only 1.49%, compared to an average poll error of 1.93% (Berg et al. 2000). In the 1992 presidential campaign in particular, the IEM was several percentage points closer to the final results than either the Harris or the Gallup election eve polls (Oliven and Rietz 2004). Though it appears that pre-election polls are used by market traders, prices on the IEM do not trail poll results. In fact, prices may predict changes in polls (Forsythe et al. 1992).

The markets work by aggregating information, both private and public (but not universal), into contract prices. However, perfect information aggregation is not possible (Grossman and Stiglitz 1980). What’s more, political traders can be subject to a number of biases; as Wolfers and Zitzewitz (2004) document, long shot bias and wish-fulfillment may be the two most common in political

---

28 Knight and Schiff (2007) make use of daily tracking polls from the National Annenberg Election Survey in 2004. However, these surveys have small samples, short duration, and are only available for the 2000 and 2004 nomination contests.

29 Prediction markets also show more stability than polls during the course of a campaign (Berg et al. 2000).
prediction markets. Even nonbiased traders will make mistakes—that is, the market is not guaranteed to identify the eventual winner.\textsuperscript{30} Traders are not a random subsample of American voters either. On average they are highly educated, young, and male. In addition, most work in academia or research (Oliven and Rietz 2004). However, the average or biased traders do not determine the market prices. Instead, Oliven and Rietz (2004) argue that “marginal, not average, traders set prices [on the Iowa Electronic Markets].” A few marginal traders, taking advantage of biases and irrational trading, can drive the market to efficient prices. This may be especially true because the IEM limits total investments and marginal traders can more easily be market makers (Forsythe et al. 1999).

Rhode and Strumpf (2007) provide excellent evidence of the market’s efficiency and resistance to tampering. In the summer and fall of 2000, the authors “engaged in a series of controlled uninformative trades in the IEM presidential markets.” They made eleven random investments, with each trade ten days apart. Given the investment limits in the IEM, the authors were able to make these trades (or series of trades) large relative to total trade volume.\textsuperscript{31} As such, prices reacted to the initial trades. However, within two hours of the trades, half of the price effect was undone and the effect was no longer statistically significant. These results lead the authors to conclude that “the long-term market dynamics [of the IEM are] not influenced by uninformative trading.”\textsuperscript{32}

\textsuperscript{30}For example, prior to the New Hampshire primary in 2008, contracts for Barack Obama to win that primary were selling for more than $90 (to win $100) on InTrade, a new political prediction market site. Hillary Clinton ultimately won the primary despite the fact that the markets gave her approximately 13:1 odds.

\textsuperscript{31}$3116$, or 2\% of the IEM’s total trade volume, was invested (Rhode and Strumpf 2007).

\textsuperscript{32}Rhode and Strumpf (2007) also note that a similar (non-researcher based) attack on TradeSports’ 2004 presidential market. Here too the markets quickly returned to previous levels.
Table 1.2 Iowa Electronic Market Contracts

<table>
<thead>
<tr>
<th>Market</th>
<th>Start Date</th>
<th>Liquidation Date</th>
<th>Contracts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Alexander, B. Dole, Kemp, Gramm, Powell, Forbes, Quayle and Buchanan</td>
</tr>
<tr>
<td>RNC ’96</td>
<td>Jan 5, 1994</td>
<td>Aug 15, 1996</td>
<td>Bradley and Gore</td>
</tr>
<tr>
<td>DNC ’00</td>
<td>Jun 14, 1999</td>
<td>Aug 17, 2000</td>
<td>Bush, McCain, Forbes, E. Dole and Quayle</td>
</tr>
<tr>
<td>RNC ’00</td>
<td>Jun 14, 1999</td>
<td>Aug 3, 2000</td>
<td>Kerry, Dean, Gephardt, H. Clinton, Edwards, Clark and Lieberman</td>
</tr>
<tr>
<td>DNC ’04</td>
<td>Feb 20, 2003</td>
<td>Jul 30, 2004</td>
<td></td>
</tr>
</tbody>
</table>

For this project, we are interested in the five markets traded on the IEM for contested presidential primaries from 1992 to 2004. For these markets, we have data on the closing price of $1 winner-take-all shares for all candidates listed on the market as well as the “rest of the field” contract. In addition to price, the IEM also provides daily data on the number of shares traded, the dollar volume, daily highs and lows and the average price. The closing prices for winner take all contracts, very naturally, imply probability of victories (Wolfers and Zitzewitz 2007). Table 1.2 contains basic information about these five markets. Contracts were traded on a handful of candidates who never entered the races (e.g. Colin Powell in 1996 or Hillary Clinton in 2004). As these candidates never collected contributions, we will not include this market data in our estimations.33

In addition to the nomination winner take all contracts, we make use of a number of complementary markets traded on the IEM to provide additional explanatory variables. Table 1.3 presents these markets. For example, in 1996, the IEM offered winner take all contracts on the 1996 Presidential election. This

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33 The IEM also has data for the 2008 Democratic and Republican nomination races. However, due to the fact that those races may not be decided until after the completion of this thesis, we will only selectively incorporate that data into this project. Moreover, FEC data from these campaigns have not been fully released in an accessible way.
market traded contracts for Clinton, another Democrat, a Republican or a 3rd Party to win the Presidency. The market was in operation during the primary season. As will be seen later, we use this market and others to ask whether general momentum shifts for the party help or hurt individual candidates’ chances of winning the primary. These results may inform conclusions about strategic primary contributors or about party-level momentum and its effects on candidates during the primary season.

In addition to the IEM, there are number of other political prediction markets in operation. The largest (and perhaps best known) is InTrade. While InTrade markets differ in some respects from the IEM (for one, they are a private company and they set initial prices rather than offering unit contracts), many features are the same. They offer political prediction market contracts that liquidate at a fixed date based on the results of a political event and their prices are measures of expectations about these events. However, InTrade did not issue markets until the 2004 Presidential election (the general, not the primary), and so we use data from the IEM and not InTrade.
CHAPTER 2

Literature Review

This literature review proceeds as follows: Section 1 covers the extensive literature on the productivity of campaign expenditures, beginning with Jacobson (1978). Section 2 discusses the literature on the determinants of contributions to political campaigns, both by political action committees (PACs) and individual donors. Section 3 examines the literature (mostly from political science) on presidential nomination campaigns. Section 4 concludes the literature review with a restatement of the goals of this thesis in light of the literature discussed.

2.1 The Productivity of Campaign Expenditures

The seminal study of the productivity of campaign expenditures in increasing vote share is Jacobson (1978). Motivated by Congressional debate on a proposed public financing law, Jacobson notes that efforts to alter the nature of campaign financing have not been informed by a clear understanding of the effects of spending on political results. Jacobson makes use of a two-stage least squares instrumental variable regression to uncover the effect of campaign expenditures by incumbent United States Senators, Representatives and their
challengers on vote share. Using data from the 1972 and 1974 elections, he finds the effects of incumbent spending to be statistically insignificant, but those of challenger spending to be positive and significant. The findings are stronger in the races for the House. Jacobson turns to two-stage least squares because of the simultaneity bias in the model. As he notes, “The expectation that a candidate will do well may bring in contributions.” Similarly, Jacobson posits an external factor, some notion of charisma or popularity, may be driving both votes and fundraising. With further results drawn from voter surveys on name recognition, he finds that campaign expenditures serve to build name recognition, especially for non-incumbents.\(^1\)

Jacobson (1978) assumes that challenger spending is exogenous and uses it as one possible instrument for incumbent spending. Green and Krasno (1988) criticize Jacobson (1978) for this poor instrumentation and for failing to control for challenger quality. Green and Krasno also fault Jacobson’s assumption of linearity as they suggest that campaign spending for either side would exhibit diminishing marginal returns. Jacobson himself acknowledges this possibility, positing that expenditures serve to increase name recognition and that incumbents’ names are already well branded. The diminishing returns may explain the differences in the productivity of spending by incumbents and challengers. When Green and Krasno (1988) reevaluate Jacobson’s data using two-stage least squares with new instruments for incumbent spending and a proxy for challenger quality (a point-scale based on name recognition and political experience), they find some evidence that the effects of spending by incumbents and challengers are similar. They also estimate subsamples of the data, divided based on challenger spending, to assess the contention of nonlinearity in spending. They find that the effectiveness of challenger

\[^1\] Lott Jr. (1991) builds such a model of brand-name building by incumbents.
spending diminishes as challengers spend more. They also note that the positive effect of challenger spending is larger for higher quality candidates. Overall, however, Green and Krasno’s results are not overwhelmingly clear. While it is certain that challenger quality is an important control in the vote-share equation, the magnitudes and significances of the productivity of spending by both incumbents and challengers are not consistent through their estimations.

As Gerber (1998) asserts, the Green and Krasno (1988) study is also faulty as they assume challenger spending is exogenous (as had Jacobson (1978)). In reality, it is more plausible to think both incumbent and challenger campaigns choose to spend more (and try to raise more money to do so) in the face of heavy spending by their opponents. Using United States Senate elections, Gerber (1998) estimates the productivity of campaign spending on vote-shares. He instruments for incumbent spending with state voting age population (the author argues that incumbents from small states will raise more money per capita) and incumbent spending in the previous Senate election (with staggered elections, this variable should not be correlated with candidate quality but should be correlated with fundraising conditions). He instruments for challenger spending with a measure of challenger wealth (based on the challenger’s occupation before the Senate run) and challenger spending in the previous Senate election. Gerber (1998) concludes that the marginal effects of spending are statistically equivalent for incumbents and challengers and that spending is very effective for both challengers and incumbents.

Erikson and Palfrey (1998) critique the literature on two major points. First, as noted and corrected by Gerber (1998), Jacobson (1978), Green and Krasno (1988), and others assume that challenger spending is exogenous. Erikson and Palfrey (1998) hypothesize that this may result from the fact that there
are not very good instruments for challenger spending. However, this leads them to their second point of contention: there are not any good instruments for incumbent spending either. To deal with this simultaneous system, rather than search for instruments and make exclusion restrictions, Erikson and Palfrey (1998) introduce a zero-covariance matrix approach that requires zero covariance between the error terms in expenditure equations and the error term in the vote expectation equation. They present three structural equations of the voting system:

\[
IE = \beta_{11} (IV) + \beta_{12} (T) + \epsilon_1
\]

\[
CE = \beta_{21} (IV) + \beta_{22} (T) + \epsilon_2
\]

\[
IV = \beta_{31} (IE) + \beta_{32} (CE) + \beta_{33} (Par) + \beta_{34} (LNV) + \beta_{35} (T) + \epsilon_3
\]

where \( IV \) is incumbent’s percent of the vote, \( IE \) is incumbent spending, \( CE \) is challenger spending, \( Par \) is expected vote from district partisan effects, \( LNV \) is incumbent’s lagged net vote from the previous election and \( T \) is time. The key in estimating these equations as a system is the zero covariance assumption: 
\[
\text{cov} (\epsilon_1, \epsilon_3) = \text{cov} (\epsilon_2, \epsilon_3) = 0.
\]

The results of Erikson and Palfrey (1998) are two-fold. First, incumbent spending matters but declines in magnitude as the incumbent gains seniority. For races with freshmen House members, incumbent spending is more productive than challenger spending (both are significant). For races with more senior Representatives, challenger spending is twice as productive in increasing vote share. The second conclusion is that incumbent spending is persistent: increases in spending in previous election cycles increases all future vote-shares. While the results they report are interesting, their zero-covariance matrix necessitates a strong assumption. Their approach requires no omitted variables that might affect both spending and voting; for instance, if incumbent
candidate quality or charisma encourages contributions (which are translated into expenditures) but also increases vote share clearly the assumption that $\text{cov}(\epsilon_1, \epsilon_3) = 0$ must be false (the quality is included in both error terms).\(^2\)

Levitt (1994) introduces a novel technique to eliminate the bias in previous cross-sectional analyses of campaign spending productivity. The estimates, Levitt notes, were biased in two ways. First, despite attempts to account for candidate quality (Abramowitz (1991) uses Congressional Quarterly expectations; Green and Krasno (1988) implement a point-scale based on experience and name recognition), no perfect control exists. In addition, district-specific factors are omitted from the standard models. Levitt presents the following model of vote share:\(^3\)

\[
V_{i,t} = \alpha_i + \beta_1 \text{Incum}_{i,t} + \beta_2 \text{Chal}_{i,t} + \gamma_t + \delta_1 \text{IncumQual}_{i,t} + \delta_2 \text{ChalQual}_{i,t} + \epsilon_{i,t}
\]  

(2.1.4)

where $V$ is the incumbent’s vote share and $\alpha_i$ is the district-specific factor. Levitt assumes that candidate quality and district factors are constant for individual candidates and districts. By using only repeat challenges in House races and first-differencing the data, this method should produce unbiased estimations of the equation:

\[
\Delta V_i = \beta_1 \Delta \text{Incum}_i + \beta_2 \Delta \text{Chal}_i + \Delta \gamma_t + \Delta \epsilon_{i,t}
\]  

(2.1.5)

\(^2\) Another attempt to correctly estimate the standard expenditure productivity model with a strong assumption is Grier (1989). He uses data on United States Senate races and finds that incumbent expenditures are positive. Because error terms are zero in expectation, Grier claims that both contributions and expectations about vote-share are independent of the error in the vote-share equation and that this allows the of OLS estimation without bias. However, this assumption, like Erikson and Palfrey (1998), requires full specification of the control vector.

\(^3\) The model presented here is stylized for the purpose of explaining the first-differencing technique. For the full model, see Levitt (1994)
Levitt (1994) finds that both incumbent and challenger spending matter, with the expected signs, but at much smaller magnitudes than previously reported in the literature. The implication is that an additional $100,000 spent nets the candidate less than a third of a percentage point increase in the vote share. Compared with previous results (e.g. Jacobson (1978)), Levitt estimates spending to be one-tenth as effective. However, Levitt’s finding—the seemingly inconsequential effects on vote share of campaign spending—may be a result of his sample selection. If candidates use spending to build a brand, it may be in these cases of repeat challenges where spending matters least, as both candidates have already built name recognition.

Stratmann (2007) suggests that faulty aggregation of campaign data may be the cause of the low and statistically insignificant estimates on the productivity of campaign spending. As he notes, previous research had assumed that a dollar of campaign spending in Montana and in Los Angeles purchases the same effect. Accounting for price heterogeneity, he finds that both incumbent and challenger advertising has a positive effect on vote-share at much larger magnitudes than in previous studies. He cannot conclude which effect is larger.

However, as Stratmann (2005) notes in a review of the recent literature, “To date, no consensus has been reached regarding the effectiveness of campaign spending on vote shares.” Some estimates for the House suggest that the marginal product of challenger spending is greater than that of incumbent spending. In the Senate and for other House estimations, the spending effects appear of the same magnitude. But few researchers are certain which result is true and fewer agree on why it might be the case. Jacobson (1978) cites diminishing returns to spending because spending is used to increase name recognition. Stratmann (2005) suggests incumbent fundraising effort (in the face of varying levels of challenger quality) is driving the results. Levitt (1994),
meanwhile, suggests unobserved variables are to blame and that spending effects are trivial.

The effects of campaign spending in presidential nomination contests are even less studied and understood. Only Nagler and Leighley (1992) study the presidential contests, focusing on the general election. Using data from the 1972 presidential election, they build a two-stage estimator. Based on game-theoretic models of resource-allocation by central-actors, they expect campaigns to spend more in states expected to be close races and states expected to be pivotal in the election and spending data supports this. Using these factors as instruments for campaign expenditures, they then estimate the effect of spending on vote-share in the presidential election and find that spending by both the incumbent and challenger increases vote share. It is not clear that these instruments—states expected to be close—are clean; states may be close because of spending decisions or their closeness may lead to more spending. After extensive literature searches, it does not appear the question of the effectiveness of campaign spending in presidential primaries has been adequately addressed.

### 2.2 Determinants of Contributions

To solve the endogeneity problem in the campaign finance literature, it is clear that we need to understand both the effect of campaign spending on voting and the effect of electoral conditions (especially pre-election expectations) on contribution decisions. Yet, the literature is surprisingly quiet on the question of the determinants of campaign contributions. Theoretical models (notably Coate 2004a; Prat 2002) acknowledge that electoral conditions have an effect on contribution decisions, and empirical work (including Jacobson 1978; Green and Krasno 1988; Levitt 1994; Gerber 1998) recognizes the need to address this
direction of causality when studying the productivity of expenditures, but little has been done to analyze this question in-depth. For the most part, work in the literature in this area has been limited to testing PAC contribution decisions and only a few conclusions have emerged.

Based on a simple Downsian model with informative and persuasive campaigning, Mueller (2003) is able to make a number of theoretical predictions about how contributors behave. Most strongly, his model implies that ideological similarity and the probability of victory are the two primary determinants of contributions. He also notes that these predictions are not unique in the literature, but have been derived from a variety of models (Grossman and Helpman 1996; Austen-Smith 1987).

Empirical work suggests that the closeness of the race is an important determinant of contributions. Using contribution decisions of agricultural lobbies and votes on agricultural policy in 1985, Stratmann (1991) finds that PACs are more likely to contribute to incumbents in close races than to similar unchallenged incumbents. Challengers raise more money in closer races as well.

Poole and Romer (1985) offer support for the claim that PACs target contributions to candidates with similar policy preferences. They use a spatial model and roll call scores for legislators to locate politicians in policy-space. They then locate PACs in this policy-space and test to see if ideological distance determines contributions. Not surprisingly, it does: Most PAC contributions are well explained by the simple spatial model. For most PACs, seniority of

---

4 Mueller (2003) also predicts that “a contributor gives to a candidate who is willing to shift her position toward that favored by the contributor.” While evidence exists that contributors may behave this way, it does not appear that politicians actually do shift (Stratmann 1992; Kroszner and Stratmann 1998).

5 This policy-space location has been further developed as D-NOMINATE (Poole 1981; Poole and Rosenthal 1997; 2001).
the incumbent has a statistically significant effect on contributions. However, the relationship is not strictly linear—it appears from their results that PACs target money to junior members of Congress and long-time members much more than to incumbents with 10 to 12 years in office. Poole and Romer (1985) also anticipate Stratmann (1991) in concluding that the closer the election (or the previous election), the more money both the incumbent and challenger receive.

Romer and Snyder Jr. (1994) use changes in committee assignments to see if PACs are more likely to contribute to legislators who regulate them or if PACs instead build up long-term relationships, as Snyder Jr. (1992) had previously documented. They find that contributions do depend on committee assignments, but also that there are interesting asymmetries based on PAC size, wealth, and the politician’s seniority. When representatives move to leadership positions in committees or to exclusive committees (e.g., Ways and Means), many more PACs choose to contribute and PACs already contributing increase their donations. Romer and Snyder Jr. (1994) suggest that “PACs care not only about representatives’ committee assignments but also about representatives’ committee experience.”

In sum, the literature suggests that incumbents and challengers raise more PAC money in close races (though it does not conclude whether this is caused by a demand or supply effect), and that PACs prefer to contribute to senior (and endangered junior) members of congress, especially those on important committees and that PACs support legislators with similar views. Despite these results, the literature is not wholly conclusive about why PACs contribute; in his literature review, Stratmann (2005) believes the determinants of campaign

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6 This may be evidence of complex strategic contributing on the part of the PACs. Very junior candidates may be the most at risk for defeat, and campaign spending improves their electoral results. Very senior candidates, while rarely defeated, may be in the best position to help PACs with legislation, as influence comes with seniority in Congress.
contributions remains an open question. Mueller (2003) notes that the literature is clear that PACs are selective and strategic in their contribution decisions, but “some disagreement exists over which characteristics of a representative affect the size and source of his contributions.” Especially interesting in light of the methodology and model at the heart of this thesis is how PACs make their contribution decisions during the course of a campaign. Stratmann (1998) looks at the timing of contributions in relation to key votes. He finds that farm PACs tended to make contributions around the dates of agricultural votes. However, given the prediction by Mueller (2003) that candidates with high probabilities of victory should receive a lot of contributions (as the expected pay-off of this support is higher), study of the timing of contributions during a campaign could be illuminating.

Despite the focus on the relationship between PACs and the candidates to whom they donate, in reality their role may not be that significant, especially in the race for the presidency. PACs are limited to $10,000 in contributions, per candidate, per election cycle, and only 4% of PAC contributions to campaigns for federal office are at or near the limit. Among candidates receiving any contributions, the average contribution is only $1700. Although the majority of all campaign funds are contributions from individuals, very little effort has been made to understand the motives of these individual contributors. Ansolabehere et al. (2003) report that candidates and political parties raised close to $3 billion in the 1999-2000 election cycle and that 80% of all contributions came from individuals. However, it much less likely that individuals are “investing” in candidates. With low contribution limits (relative to the total amount of money donated or spent) and the large number of contributors, one individual is too small to exert market power on a candidate. Ansolabehere et al. (2003) insightfully conclude that “campaign
contributions should be viewed primarily as a type of consumption good, rather than as a market for buying political benefits.” Individuals are especially important in the presidential nomination contests: in the 2004 Democratic nomination race, every candidate received more than two-thirds of his or her campaign receipts from individuals, and the two largest fundraisers (John Kerry and Howard Dean) counted on individuals for more than 90% of their funds.

Grant and Rudolph (2002) use data from surveys to analyze the contribution behavior of citizens in the 2000 elections. They asked respondents if they had been solicited by a political party, individual candidate (for any office), or other political group to give money during 2000. They find that contributors are a small group of citizens who are wealthier, whiter, and have more education than the typical voter (or citizen). They are also much more partisan. According to an American Politics Study in 2000, only 11.6% of respondents contributed. 53% of all contributors made more than $60,000 per year and more than half the money raised by candidates in 2000 came from individuals making more than $100,000 per year.7

Beyond summary results, Grant and Rudolph (2002) develop a model of solicitation and donation. They find that solicitation of funds by campaigns and parties is an important determinant of whether or not a person contributes (and how much). While they acknowledge that the relationship may be evidence of a selection bias—campaigns and parties solicit individuals “with greater financial and informational resources” who are more likely to give in all cases—they argue there is a “stimulus mechanism” in play as well. In fact, they contend that for contributions both to parties and candidates, “the effects of informational resources and solicitation … outweigh financial resources.”

7 In 2000, median household income was just below $45,000.
This solicitation effect is critical to the idea that money makes money for candidates. Ultimately, Grant and Rudolph (2002) find that high levels of education, political knowledge and interest, partisanship and whether or not an individual was solicited are all very important in the decision of whether or not to contribute. These results are similar to earlier findings about the differences between citizens who donate to political campaigns and those who do not (Brown Jr. et al. 1995; Rosenstone and Hansen 2003).

2.3 Presidential Nomination Contests

While this thesis is novel in its study of the dynamic relationship between campaign spending, fundraising, and electoral conditions in presidential primaries, it follows a literature on the presidential nomination process, mostly from political science. Gurian and Haynes (2003) provide an overview of the nomination contests, including a classification system (there are two types of races: those with and those without a frontrunner) and the common spending strategies of “well-known and well-financed” candidates versus those of “long-shots.” They argue that these race and strategy “types” are important in determining the dynamics and the results of a nomination contest. Steger (2007) presents a forecast model of the primary vote. He finds significant differences between Republican and Democratic nomination contests: “Republican nominations are largely predictable and determined mainly by events occurring prior to the primaries, while Democratic nominations are relatively unpredictable before the primaries and are susceptible to momentum during the primaries.” Specifically, polls

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8 Financial resources, as measured by income, mattered occasionally but at smaller magnitudes than other variables. This led Grant and Rudolph (2002) to conclude that although donors tend to be much wealthier than non-contributors, “financial resources . . . were not the decisive factor in determining the likelihood of party or candidate contributions in the 2000 elections.”
late in the year before the general election and early endorsements are significant predictors of the Republican nomination, whereas the results of the New Hampshire vote are the most important predictor of the Democratic nomination.

Gurian and Haynes (2003) also stress the importance of momentum and its interaction with media coverage and fundraising (echoing the seminal tracts on the momentum theory of nomination: Aldrich 1980; Bartels 1988). More recently, Knight and Schiff (2007) present a model of momentum and social learning and apply it to the 2004 Democratic primaries. They posit that voters are uncertain about candidates and their quality and that later voters attempt to learn what earlier voters “know” as signaled by early voting results. They found that, due to their effect on later voters, early voters “have up to 20 times the influence of late voters in the selection of candidates.” This follows the standard belief in the literature that voters in Iowa and New Hampshire are crucial to nomination (Bartels 1988). 

Research suggests that voters and contributors are concerned about and affected by a candidate’s “viability,” the probability a candidate will be nominated. Abramson et al. (1992) report that most voters will only vote for a candidate who they believe has a chance to be nominated. Crespin et al. (2000) contend that low viability diminishes a candidate’s ability to raise money. Using exit poll data, Abramowitz (1989) finds that voters in both parties “weighed electability in addition to their general evaluations of the candidates.” However, he also found that notions of “electability” were strongly influenced by viability. If increases in viability can increase viability,

9 Steger et al. (2004), however, argues that in recent elections the effect of New Hampshire primary results serve as more of a “correction” on pre-primary polls—still a major role for the tiny Granite State but not the same magnitude previously suggested in the literature. Steger et al. (2004) posit that early fundraising and the importance of organization and cash reserves have reduced the power of the signal coming from New Hampshire.
as the literature suggests, the nomination process may be dominated by these

echos.

Gurian and Haynes (2003) also argue that “candidate evaluations do play
a part in voters’ decisions but information about the candidates’ experience,
ability, and character is often limited.” Dutwin (2000) studies knowledge
during the 2000 primaries and finds that citizens learned “substantive amounts
of information during the campaign” and that more “learning” occurred in
states with competitive primaries (and the learning was specifically about
the candidates contesting those primaries). This is evidence that spending
during primary campaigns serves to inform voters about candidates’ policies
and valence. However, Dutwin (2000) acknowledges that while knowledge
does increase, its ultimate levels are still low, thus reinforcing Gurian and
Haynes (2003). This “learning” channel may have dynamic implications for
both probability of victory and fundraising.

In the presidential primary literature, the seminal studies of the contribution
process in nomination contests are Mutz (1995a;b), Brown Jr. et al. (1995),
Damore (1997), and Hinckley and Green (1996). All attempt to explain the
dynamic decisions made by contributors to presidential campaigns. However,
in contrast to the literature on the determinants of contributions cited above,
these studies focus almost exclusively on the individual contributor. As
Norrander (1996) notes in a field essay on the presidential nomination process,
“Interest group involvement in the presidential nomination stage has mostly
been ignored.” This is likely due to the smaller role, as suggested by the
raw contribution data, played by PACs in these nomination contests. In the
2004 primary, none of the major contenders on the Democratic side received
more than 2% of their total contributions (by dollar amount) from PACs; in
2000 a similar trend held for Republicans and Democrats. Furthermore, PAC donations tend to occur later in the campaign, usually after one candidate has emerged as the nominee (Sorauf 1988).

Brown Jr. et al. (1995) study the contribution decisions of individual contributors and the fundraising tactics of campaigns with regards to these donors as well as the effects of the money chase on the nomination race in 1988 and 1992. They begin by assessing the demographics of the contributors to presidential campaigns. Like Grant and Rudolph (2002), they find that contributors are very likely to be white, wealthy, well-educated, and male. Contributors also tend to be a stable group election to election. In 1988, 83% had contributed previously to a presidential nomination campaign. The contributors were also very partisan—only 6% said that they would “give equally” to both parties. In contrast to many citizens during the primary season, contributors were also well informed about their favored candidate and his or her opponents. Finally, Brown Jr. et al. (1995) also note that candidates raise large percentages of their funds from donors in their home states and that these percentages tend to remain stable over the course of the campaign.

Damore (1997) builds a model that uses electoral success in individual primaries and caucuses, viability (percent of delegates captured), and media coverage to explain fundraising in Democratic nomination contests in 1984, 1988, and 1992. His results suggest that electoral success in primary contests has a huge impact on the fundraising of long-shot candidates, but an insignificant effect on the finances of established candidates. More, media coverage has a strongly positive interaction with this success—if a long-shot wins a primary but no one hears that, the success does the candidate no
financial benefit. Finally, Damore’s results also suggest that viability is the only variable that affects the fundraising conditions of established candidates, though not at a large magnitude.

While the results presented by Damore (1997) are interesting, his methodology is questionable. For one, he measures contributions as the amount of contributions made to the candidate minus the ratio of all contributions made that week to the number of actively campaigning candidates. While this measure does control for the fluctuating number of candidates seeking the nomination, it also assumes that contributions are zero-sum. If contributions to all candidates were to double (in equal proportions by candidate) from one week to the next, Damore’s measure would ignore this. However, the empirical literature (e.g. Stratmann (1991) with PAC contributions) has consistently found that in close races all sides tend to raise more money. Damore (1997) also chooses to restrict his time-series to the primary season, ignoring the so-called “money primary” of the year before the nomination campaign when a good deal of money is raised by all candidates, long-shots included. Finally, Damore (1997) does not consider that fundraising may be an autoregressive process and, as such, does not include lags of previous fundraising results. The measurement error and model misspecification will likely lead to biased results and misleading and limited conclusions. Specifically, the use of time-series variable that is autocorrelated without proper controls violates standard error assumptions and could lead to spurious correlation.

In a pair of papers analyzing the 1988 Republican and Democratic nomination contests, Mutz (1995a;b) tracks the effects of “horse-race coverage” by the media on contribution decisions from July 1987 (a full year before the convention) to the date the candidates exited the race. In her study of the Democratic race, she first uses polling data to categorize the candidates’
supporters as either loyal or not. The polls suggest that Jesse Jackson and Al Gore both had fiercely loyal support (especially Jackson—71% of his supporters reported strong commitment to his campaign) while Michael Dukakis and Dick Gephardt did not. She then regressed the number of contributors to each campaign, per week, on horse-race coverage, voter support, electoral outcomes and “war chest” size. She theorizes that candidates with weak constituency support will receive more contributions only when their voter support increases (representing a larger pool from which to solicit donations). For Gore and Jackson, with loyal bases, her prediction is that negative horse-race coverage in the media will lead to rally effects: contributors loyal to the candidates would rush to donate in the face of their candidate losing ground. Both of these predictions hold in her estimations: for the candidates with loyal bases, horse-race coverage has a negative coefficient and for the other candidates, voter support is important. In the companion paper, Mutz (1995b), covering the 1988 Republican race, the author finds that media coverage of viability matters most for the also-rans, Bob Dole and Jack Kemp, but not for sitting Vice President George H.W. Bush or long-shot televangelist Pat Robertson. Instead, Bush’s contributions depended on coverage of his opponents. For Robertson, like the results of the Democratic study, his more loyal base responded with contributions to the “threat of a lost cause” in media coverage.

Hinckley and Green (1996) analyze the effect of electoral conditions on fundraising in a more formal statistical model. Studying the 1988 Presidential nomination contests, they find support for an “organization-driven” model where fundraising is tied more directly to the quality of a candidate’s base and fundraising efforts than to swings in momentum. They find that most money is raised before the primary season begins and that while victories (or losses) in
primaries may have effects on fundraising, these effects are short-term shocks. Most campaigns relied heavily on “contributions from their original bases and repeat donors, even during the primary season.” Running an ARIMA regression, Hinckley and Green (1996) conclude that electoral conditions had little effect on fundraising during the course of the 1988 primary campaign. They also use interrupted time series analysis around major primaries and caucuses but conclude that the events had only short, temporary and small effects.\textsuperscript{11}

There are a few important implications for this thesis in the literature on presidential nomination contests. To begin with, there may be fundamental differences between races with a clear front-runner and those without, both for fundraising and campaigning (Gurian and Haynes 2003). Steger (2007) underlines the differences between the determinants of the Republican and Democratic nominee. The literature also underscores the crucial nature of “viability” (Abramson et al. 1992; Crespin et al. 2000; Abramowitz 1989) and the apparent insignificance of candidate qualities (Gurian and Haynes 2003). However, models of campaign learning suggest that candidate qualities may matter more later on in the campaign (Dutwin 2000). For momentum, Knight and Schiff (2007) demonstrate that early primary voting results have major effects of on later results.

Finally, of major interest to this thesis are the papers covering fundraising in presidential nomination contests. Despite the methodological issues raised with Damore (1997), his theoretical hypotheses and findings merit note. He expects and finds major differences in the fundraising models of long-shot and established candidates. In addition, he argues that electoral success, in conjunction with media coverage, matters only for long-shots and that

\textsuperscript{11}The events with the largest impact on contribution flows were official announcements made by candidates to quit the nomination contest.
viability (as measured by the ratio of pledged delegates to delegates needed for the nomination) is the only determinant of fundraising for established candidates. Brown Jr. et al. (1995) establish a number of important stylized facts about individual contributions that will be relevant in modeling their decisions: they are partisan, well-informed of all the candidate positions, and a stable group from one election to the next. Hinckley and Green (1996) find that organizational and candidate specific factors (not electoral conditions) determined fundraising in the 1988 primaries, whereas Mutz (1995a;b), studying the same election, finds that candidate qualities (more precisely, their supporters’ loyalty) were important determinants of the way in which electoral results affected contribution decisions.

2.4 This Thesis in Light of the Literature

The central goal of this thesis is to investigate the dynamic relationship between the probability of victory, campaign contributions, and campaign expenditures in presidential nomination campaigns. We will analyze this simultaneous system to uncover the effect of contributions and expenditures on the probability of victory and the effect of expected election results on contribution decisions. Specifically, we study the determinants of contributions to campaigns from individuals; the effects of political events on these contributions; the determinants of political base and non-base contributions; the effect on electoral expectations of fundraising results and campaign expenditures; and the feedback mechanism between the effects on fundraising on expectations and expectations on fundraising. Our approach is novel in the literature in four major ways; the dynamic perspective, the focus on presidential nominations, its use of prediction market data rather than electoral outcomes or polling, and the emphasis on the decision-making of individual
Much of the previous work in the campaign finance literature, especially on the effects of campaign spending on vote share, has been limited to analysis of a cross-section of completed Congressional races (Jacobson 1978; Green and Krasno 1988; Gerber 1998; Erikson and Palfrey 1998). While this has allowed for a larger dataset with a variety of cross-sectional explanatory variables, it does not shed light on the dynamic relationship between fundraising and electoral conditions during the campaign. Gerber (1998) asserts that one important theoretical question about fundraising and political expectations that has not yet been conclusively addressed in the campaign finance literature is whether it easier to raise money with increases in the probability of victory? This thesis aims to tackle this question directly.

Moreover, the cross-sectional static approach simplifies the role of money. Aggregated over the whole of campaign, candidates must equate funds spent with funds raised. However, during the course of a campaign, candidates can (and do) run short-term surpluses and deficits. Though not always possible (the expenditure data is only measured quarterly), the dynamic approach allows us to attempt to separate contribution decisions (the supply of money to campaigns) from expenditure decisions (the use of money in campaigns) and examine the processes in depth.

The dynamic approach to the fundraising question also allows a more direct synthesis with portions of the political science literature on political campaigns. From Aldrich (1980) and Bartels (1988) on, these studies investigate how electoral conditions and expectations change during the course of campaigns. They also seek to explain which shocks and which initial factors are important in determining the eventual nominee. To this point, research about fundraising and expenditures has not been fully integrated into the dynamic general
equilibrium model of elections.

Most politicians would be loathe to admit that personal attributes are an unimportant piece of the election general equilibrium framework. But, for the most part, the static cross-sectional studies are also unable to control for candidate-specific effects. Levitt (1994) is the exception, though as noted earlier his use of repeat challenges in the House introduces an important selection bias. Candidate-specific effects are not the only sources of unobserved heterogeneity that the cross-sectional studies cannot adequately address. Fixed district factors, voter preference effects, and campaign (or fundraising) strategy effects may all bias the cross-sectional work. This study should be able to minimize or eliminate these types of problems. The dynamic aspects of this thesis allow for the use of certain exclusion restrictions and estimation techniques that enable us to control both for unobserved factors and eliminate omitted variable bias, but also to make causal arguments in the presence of a complicated endogenous system. Some studies have relied on OLS estimation—these estimates are only valid if all control variables have been included (Jacobson 1978; 1985; 1990; Abramowitz 1988). Other studies make use of instrumental variables to minimize bias and imply causality; however, these suffer measurement error and mispecification if, as pointed out in the literature, the instruments are not very strong or clean (Gerber 1998; Green and Krasno 1988). Finally, other studies make use of zero covariance assumptions to infer causality. However, this requires no omitted variable bias, often too strong an assumption with a number of potentially unobserved variables (Erikson and Palfrey 1998; Grier 1989).

In restricting research to congressional races, the literature has also been unable to address questions that relate to the regulation and function of presidential races. Empirical results based on state or congressional elections
may not be relevant to the fundamentally different (and arguably more important) campaign for the White House. Though the President’s direct effect on the overall economy is unclear (Olken and Jones 2005), it is hard to discount the fact that the office has a large role in nearly all aspects of foreign and domestic policy. Goldstein (1978) underlines the importance of understanding how presidents are elected and what role money plays in the situation when he argues that “the most direct constraint upon presidential power” is the public’s choice to elect a qualified leader.

Specifically, our research will shed light on presidential primaries. In a sense, the nominations may be more important than the general election in shaping the political equilibrium. As Tammany Hall chieftain Boss Tweed famously quipped, “I don’t care who does the electing, so long as I get to do the nominating.” The candidate nominated by each political party is a major influence on the party and the country: the nominee is the image and spokesperson of the party, helps to set the party’s issue and policy platform, and defines “the ideological direction” of the party (Steger 2007). We have to question the democratic nature of the primary process if the positive feedback between fundraising and election expectations allows early fundraising (and the earliest fundraisers) to determine each party’s nominee. In theory, the nomination phase may be the time when expenditures and contributions have the greatest influence, as little is known about the candidates and party affiliation is not available as a signal to voters for differentiating candidates. (Goldstein 1978).

Previous analysis has also centered on the race between an incumbent and a challenger from different parties running head-to-head. These candidates are competing against one another for votes, though not usually campaign contributions. Even this competition over votes may be limited to a small
selection of swing voters in each district or state. In the presidential nomination races, candidates with broadly similar ideologies (they are, after all, in the same political party) compete over the same donors and voters. As Grant and Rudolph (2002) report that only 10% of Americans contribute to political campaigns and that they tend to be strongly partisan, and Brown Jr. et al. (1995) finds that the contribution base for each party is relatively stable election to election.

The novelty and significance of the political prediction market data has been discussed in the preceding data section, but it merits repeating. For one, market data is more accurate than polling and much more frequent (Berg et al. 2000). In addition, it asks the “right” question: “who is going to win?” rather than “who will you vote for?” The prediction market data also allows us to investigate the nominations dynamically rather than from a cross-sectional perspective.

Finally, given the dominant position of individual contributions in total contributions, this thesis will focus on the relationship between the probability of victory and contributions from individuals. Though the model of electoral general equilibrium in the previous chapter emphasized the possibility of a special interest group of contributors skewing voting choices, the interest group in question may not have the traditional form. As we detailed above, individuals supply most of the money in presidential politics. However, contributors are far from a representative subsample of American voters. If contributions help determine election results, then policies may reflect the preferences and the biases of the contributors.

The enormous amount of money in politics is, in some ways, a result of a willingness of individuals to contribute, especially in presidential politics where PAC contributions are an insignificant source of funds. Yet this political consumption remains something of a half-billion dollar mystery (Ansolabehere
et al. 2003). Do electoral expectations factor into the decisions of individual contributors? How do the contributing decisions of supporters of front-runners or long-shots vary?

$611$ million was contributed to presidential candidates in 2004, including $135$ million to losing Democratic primary candidates.

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CHAPTER 3

“Battle of the Bucks”

When Elizabeth Dole suspended her campaign for the Republican nomination in October 1999, fellow candidate John McCain remarked, “I’m afraid that she’s lost the battle of the bucks and not the battle of ideas. And that’s unfortunate for the whole process.” Dole, a former cabinet secretary under both Ronald Reagan and George H.W. Bush and the wife of 1996 Republican presidential candidate Senator Bob Dole, was seen in the press as a very strong contender, but never raised enough money to compete with front-runner George W. Bush. Bush hauled in a record $8 million in the first quarter of 1999—more than a year and a half before the general election—and continued to raise record sums throughout the campaign. In fact, Bush raised so much money from individual contributors that he did not apply for public matching funds which would have restricted his spending, making him the first non-self-financed candidate to forgo these funds.

Given their similar policy preferences, most political analysts expected Dole’s withdrawal to be to Bush’s benefit. The Hotline noted that she left Bush as the “lone champion of the Republican establishment,” and USA Today wrote

that her supporters in Congress were already pledging to follow Bush.\(^2\) On the campaign trail, Bush praised Dole and recited their shared beliefs. The similarities between the Bush and Dole campaigns did not stop with policies. Both candidates had the name recognition that comes with politically famous families, as a Bush or a Dole had been on the Republican presidential ticket since 1976. In addition to their notability, both had extensive political machines to tap into: Bush had his father’s donor list from 1992 and Dole had her husband’s supporters from 1996. In January 1999, it was by no means clear that Bush would trounce his Republican rivals and go on to win the Presidency and that Dole’s campaign would fail five months before the Iowa Caucus. In part, it is clear that Bush’s ability to raise huge sums of money was the reason he and Dole had such different electoral outcomes. But where did Bush’s money advantage come from? Why was he able to out raise Dole (and all other Republican candidates in 2000) so substantially?

In this chapter, we will attempt to answer these questions about the determinants of political contributions and to analyze fundraising dynamics during the presidential nomination campaigns. The chapter proceeds as follows: First, we discuss two models of campaign contributions and their testable hypotheses. Then, we propose a number of stylized facts about individual contributions, reviewing the relevant literature discussed earlier, and consider the implications on the contribution models. Using an exclusion restriction, we estimate Auto Regression Integrated Moving Average (ARIMA) time-series models for contributions to each campaign and expand the estimations to include possible explanatory variables in an ARMAX setting. We formally test these models in an attempt to estimate the determinants of presidential primary contributions and discuss the implications of our

\(^2\) Judy Keen, “Dole’s backers are leaning toward Bush,” *USA Today*, October 21, 1999.
findings for the models of fundraising. Finally, we use an interrupted time series analysis to determine the impact, if any, of specific electoral shocks on contribution decisions and fundraising flows.

3.1 Campaign Fundraising Models

Hinckley and Green (1996) suggest that there are two models of campaign fundraising in the presidential nomination process. The first explanation, for which they find support in their research, is the organization-driven model. Under this framework, campaign fundraising is not a function of electoral expectations (or results), but rather a process that “relies heavily on organizational exploitation of candidates’ political bases.” The base is a group of contributors who have given before, either to the candidate in his or her previous campaigns for other political office or to similar candidates in other campaigns. These bases tend to be either geographic or ideological (or some combination). Research suggests that contributors are unlikely to donate funds to a candidate unsolicited, even one that they have supported financially in the past (Brown Jr. et al. 1995). In light of this fact, campaigns have adopted a strategy to build an early organization and “systematically mine the initial base” (Hinckley and Green 1996). Given that the organizational strength and the candidate’s ideological and geographic base should be relatively constant over the course of a campaign (at least until the candidate runs out of money), it follows that the organization-driven model fundraising flows will be relatively stable over the course of a single campaign, though perhaps with more donations made early in the process (especially before the primary season begins) before the base is exhausted. Critically, swings in momentum or electoral conditions are not expected to have (lasting) effects on campaign contributions.
The second model of campaign fundraising flows mirrors the traditional view of electoral momentum during a campaign (studied in the presidential nomination contest by Bartels 1988; Aldrich 1980). The model holds that candidates’ success in primaries or caucuses or other “election events” (press coverage, major speeches or gaffes, debates, etc.) can propel fundraising. These successes or failures signal information about the true quality of candidate and donors update with this information and make contributions accordingly. Gurian (1990) and Gurian and Haynes (1993) suggest that “long-shot” candidates spend campaign funds in accordance with a momentum theory of donations. These candidates make strong efforts to do well in a few early and well-publicized events, hoping to use this success to catapult their campaigns ahead financially and politically. Anecdotal evidence suggests that Jimmy Carter used this strategy to great effect in 1976 (Bartels 1988). While it is telling that campaigns act in a manner consistent with a belief in the momentum process, it does not guarantee the model matches the true underlying process.

The momentum model predicts that campaign fundraising flows will be related to electoral success (or more broadly to the perceptions and expectations of electoral success). It also discounts the impact of organizational strength on fundraising and makes no predictions about the geographic location of funds. Finally, this model predicts more donations during the primary season. While some candidates may pick up momentum before the primary season (for example, from endorsements or debate performance) it is more likely that actual election results, as stronger unambiguous signals of campaign success, are more likely to generate significant electoral momentum.
3.2 Individual Contribution Decisions

Although individual contributors are discussed in the campaign finance literature, there is not a standard model of contribution decisions. To begin with, we consider the insights of standard voter-choice models and the research on voter and contributor decisions during nomination campaigns to produce a series of stylized facts (or expectations) about individual contribution decisions. As addressed earlier, theory suggests that voters evaluate candidates on two axes (policy and valence) and cast their vote accordingly.\(^3\) It is likely that potential contributors begin with a similar calculation. Brown Jr. et al. (1995) suggest that some contributors may donate money to multiple candidates. These multiple donors, however, are the rare exception not the rule. Most contributors are also well informed of the positions of all candidates (Brown Jr. et al. 1995). While ideology or signals about valence may affect which candidate a contributor chooses, they are unlikely to play a role in the timing of contributions. Voters do tend to learn about candidates over the course of a campaign, but contributors tend to be well informed much earlier (Dutwin 2000; Brown Jr. et al. 1995).

Theoretical models of PAC contributions predict that increases in the probability of victory in turn increase contributions. If we assume that the benefits of supporting a candidate are only realized by the lobby if that candidate wins an election, then this fact is not surprising (Mueller 2003).\(^4\) However, for voters, who are much more likely to contribute as a form of political consumption and are unlikely to receive any return on their

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\(^3\) Of course the first axis, policy, may be \(n\)-dimensional. But the evaluation remains the same. Voters support candidates who maximize their voting utility function.

\(^4\) The extreme case of this risk-aversion on the part of PACs is the finding that PACs tend only to contribute to presidential nomination campaigns once the nominee is nearly certain (Sorauf 1988).
investment in a candidate, it is not clear that the same mechanism would result in a positive relationship between the probability of victory and likelihood of contributing. However, research on the voting decisions of partisans during the nomination process suggests that a candidate’s viability is very important to a voter’s decision (Abramson et al. 1992; Crespin et al. 2000; Abramowitz 1989). As Brown Jr. et al. (1995) note, many supporters offer more than a check (and presumably a vote)—they donate their time and their influence. In this way, contributing to a campaign is a very public act. This visible connection with a campaign makes it likely that contributors would care even more about viability than the average voter.

The findings that contributors tend not to give unless asked and that candidates solicit funds from a core base in all of their campaigns for office are major motivating factors behind the organization-driven model. On the individual contributor level, this implies that there is not competition over contributors between candidates, but instead each candidate brings his or her own base into the national race. However, the pool of contributors to the presidential nomination campaign also tends to be very stable from election to election. This underscores the importance of organization in two ways. First, campaigns need the organizational strength to reach out to these potential contributors and ask for the money, whether through direct-mail, phone, or even internet solicitation. Secondly, the campaigns need to know who to target. Candidates with extensive experience running for office have developed these donor lists and will have an easier time tapping into them. The dynamic implications of these points are not necessarily obvious; campaigns may have a constant organizational strength or they may develop their organization as nomination contests continue.

In sum, we find theoretical support for the fact that individual contributors
may care about viability, policy, and valence (which they can observe early in the campaign, if not immediately, for all candidates) and that they are more likely to contribute to candidates to whom they have contributed before (especially those candidates with a strong enough organization to pursue the contributions). These results imply complex findings: fundraising should both vary with political conditions during a campaign and also depend on initial and fixed candidate qualities. The reconciliation of these findings and the two suggested fundraising models described above may be a hybrid model that depends on candidate qualities and organization for those candidates perceived as front-runners (because contributors are less worried about short-term changes in viability), but more on the expectations and conditions of the nomination race for other, long-shot candidates.

3.3 Identifying the Time-Series Model

The first stage in this estimation process is identifying the time-series nature of the contribution data. As discussed earlier, all data on contributions comes from the FEC and the raw data is at the contribution level. We aggregate it to weekly observations of the sum of contributions and the number of contributors. This aggregation serves a number of purposes. First, it is theoretically unlikely that any campaign event would have an instant effect on contributions (that is, on the contributors themselves) or that the timing of this effect would be uniform across contributors, especially measured at the daily level. In addition, contributions fluctuate noisily over the course of a week and this aggregation serves as a smoothing of the data. Finally, while the FEC requires campaigns to date the contributions, the dating is not uniform. Campaigns may record the date the check was written, received, or processed.

5 This smoothing also deals with the issue posed by the rarity of weekend contributions.
By aggregating to weekly data, we hope to minimize this measurement error.\textsuperscript{6}

Examining the relevant histograms, we find that the natural log of weekly contributions is distributed normally, so we will use this transformation of the series. We then calculate autocorrelation functions (ACFs) and partial autocorrelation functions (PACFs) of this natural log transformed series. For each candidate, ARIMA (1,0,0) models offer the best fit, as the ACFs decay exponentially or as sine waves and the PACFs spike only on the first lag. Studying contribution flows for the 1988 nomination campaigns, Hinckley and Green (1996) also find that the flows are well-characterized by ARIMA (1,0,0) models.\textsuperscript{7}

In addition to a time-series examination of the dependent variable, we also look at the time-series aspects of the independent variables, especially the price data drawn from the IEM. At the daily level, there is evidence that probability of victory follows some sort of random walk pattern (ARIMA (0,1,0)). This is not surprising: asset prices are typically modeled with random walks, and the IEM prices are essentially a class of asset price. However, once the prices are aggregated to weekly data by selecting the last observation of the prices each week the process is better characterized by an AR(1). The series also exhibits non-stationary variance. In general, prices from the period before the Iowa Caucus have a much higher variance than prices during the voting season.\textsuperscript{8}

Using Box-Cox estimation, we find that the price series for most candidates

\textsuperscript{6} Weekly data is used in the relevant fundraising literature (Hinckley and Green 1996; Damore 1997; Mutz 1995a,b).

\textsuperscript{7} For some candidates, there is also evidence of quarterly seasonality (spikes in the PACFs at lag 13). However this is merely an artifact of the end of quarter recording issues mentioned in the data section. When the very last day of each quarter is dropped from the series, the implied seasonality disappears.

\textsuperscript{8} This variance result echoes work by Erikson and Wlezien (2008) on polls. Their results show that the variance in primary season polling data is much lower once voting begins and that variance declines in general as the election date approaches.
require a log-transformation to stabilize their variance. The other primary independent variable in our estimations is a control for party conditions during the nomination process. We hypothesize that the overall political climate may have an effect on contribution decisions to nomination candidates. These series are measured at the weekly level and drawn from various contracts traded on the IEM concurrently with the nomination contracts, such as the probability that any Republican wins the White House (in 1996) or that Republicans win control of the House (in 2000). All political climate parameter series appear to be AR(1) processes as well with stationary variance. The ARIMA(1,0,0) estimation filters independent series through the dependent variable’s ARIMA model, allowing us to control for the time-series nature of both the dependent and independent variables.

### 3.4 Estimating the Models

All ARIMA models of contributions, which will be estimated separately for each candidate in each year’s nomination process, are similarly specified. The model is:

\[
(1 - \phi_1 B)C_t = \beta_1 V_{t-1} + \beta_2 P_{t-1} + \beta_3 D_{t-1} + \epsilon_t \quad (3.4.1)
\]

The models are estimated with an AR(1) term for the dependent variable \(C\), the natural log of weekly contributions from individuals) and the one-week lag of independent variables probability of victory \(V\), natural log transformed), the party popularity control, \(P\), and days until the convention, \(D\). For robustness, all models were also estimated with the natural log of the number of contributions as the dependent variable. All variables remained significant (or insignificant) at the same levels and the implications were nearly identical.

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9 Not all series were stabilized by the log transformation but in the interest of cross-estimation comparison we standardize the transformation.
Table 3.1  Iowa Electronic Market Contracts

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<td>Quayle and Buchanan</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Clark and Lieberman</td>
</tr>
</tbody>
</table>

The sample period begins with the opening of the nomination contracts on the IEM (see table 3.1) and ends either with the formal announcement of withdrawal by the candidate or the beginning of the national convention (the liquidation of the contract). Due to the late start of the 1992 Democratic Nomination market (January 1992), there were not enough observations to estimate the models.

As we noted earlier, a chronic issue in the campaign finance literature is the endogeneity of electoral results (or expectations) and campaign fundraising. While the issue has primarily figured in the estimation of the effectiveness of campaign spending (regressing vote results on money), it does not disappear when building the model in the reverse direction. Fundraising flows may change because of movements in the probability of victory (as is the implied causality of the models in this section) or they may cause the movements in the prediction markets. However, with an exclusion restriction and a well chosen lag structure, it may be possible to deal with this endogeneity problem. This method is wholly dependent on the time-series nature of our novel dataset because cross-sectional data would not allow for such techniques. When a campaign receives a check from a contributor, the
contribution is not immediately available for campaign spending. The check must first be recorded and vetted before the funds can be transferred to the campaign. Even after this process is completed, due to the large number of contributions and each individual contribution’s relatively small amount, it would violate standard organizational budgeting theories for campaigns to update their spending decisions daily (or even weekly) as new contributions flow to the campaign. The resulting implication is that in the short run, the relationship between a campaign funding and the probability of victory is not indeterminate. Rather, we argue that the causality must run from the electoral conditions to the contribution decision. Using this restriction, the ARIMA models are valid and the estimated relationships can be interpreted in a causal sense. The next sections present results for each of the nomination contests in the sample and summarize the implications for the models of campaign contributions.

3.4.1 Republican Nomination in 1996

Senate Majority Leader Bob Dole (R-KS) won the 1996 Republican nomination, outpacing fellow Senator Bob Gramm (R-TX), former Governor Lamar Alexander (R-TN), publisher Steve Forbes, and political pundit Pat Buchanan. Dole was clearly the front-runner throughout the campaign; a contract for him to win the nomination opened on the Iowa Market at $39, nearly $20 higher than the all other candidates, and the price never fell below those of his closest challengers during the entire campaign. However, fundraising was

\[^{10}\text{Though the IEM is an effective proxy for electoral conditions because of its ability to aggregate disparate information, it is unlikely it would be able to aggregate all of the private information about contributions (especially when market participation is does not include even a small percentage of all contributors). The exclusion restriction should still hold, though we may expect that the market is able to include contribution decisions into prices before the actual contributions are turned into expenditures. If this happens, it may be that the markets are forward looking with respect to spending.}\]
a different story. Gramm began his campaign with a large transfer from his previous Senate campaign (more than $5 million) and a $4.1 million fundraising event the night before he declared in February 1991. Buchanan, who won the New Hampshire Primary, had the experience from his insurgency campaign in 1992 against President George H.W. Bush and passionate supporters. Forbes, meanwhile, had his personal fortune to draw on, allowing him to self-finance a portion of his campaign, which he did to the tune of $37.9 million (including $16.5 million in 1995). Perhaps more importantly, Forbes’ personal assets eliminated the need to spend time raising funds. Figures 3.1 and 3.2 display the IEM prices and the flow of fundraising for each candidate. Table 3.2 presents the results of each ARIMA model, estimated by candidate.

The autocorrelation parameter in these models is the first telling result. To begin with, the fact that these models are characterized by AR(1) speaks to
Figure 3.2

Table 3.2 1996 Republican Fundraising ARIMA

<table>
<thead>
<tr>
<th></th>
<th>Alexander</th>
<th>Buchanan</th>
<th>Dole</th>
<th>Forbes</th>
<th>Gramm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of Victory</td>
<td>.604*</td>
<td>.587***</td>
<td>-.473</td>
<td>.375</td>
<td>-.095</td>
</tr>
<tr>
<td></td>
<td>(.336)</td>
<td>(.172)</td>
<td>(1.620)</td>
<td>(2.124)</td>
<td>(1.079)</td>
</tr>
<tr>
<td>Republican Price</td>
<td>.023</td>
<td>-.046</td>
<td>.072</td>
<td>.245</td>
<td>.093</td>
</tr>
<tr>
<td></td>
<td>(.115)</td>
<td>(.066)</td>
<td>(.052)</td>
<td>(.020)</td>
<td>(.105)</td>
</tr>
<tr>
<td>Days to Convention</td>
<td>.002</td>
<td>-.0006</td>
<td>.0002</td>
<td>-.050</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>(.006)</td>
<td>(.003)</td>
<td>(.004)</td>
<td>(.111)</td>
<td>(.004)</td>
</tr>
<tr>
<td>Constant</td>
<td>8.916**</td>
<td>11.768***</td>
<td>10.490</td>
<td>9.987</td>
<td>6.888*</td>
</tr>
<tr>
<td></td>
<td>(3.696)</td>
<td>(2.375)</td>
<td>(7.658)</td>
<td>(15.206)</td>
<td>(3.673)</td>
</tr>
<tr>
<td>AR(1)</td>
<td>.488***</td>
<td>.439***</td>
<td>.556***</td>
<td>-.423</td>
<td>.605***</td>
</tr>
<tr>
<td></td>
<td>(.133)</td>
<td>(.100)</td>
<td>(.097)</td>
<td>(2.259)</td>
<td>(.136)</td>
</tr>
<tr>
<td>N</td>
<td>54</td>
<td>50</td>
<td>81</td>
<td>8</td>
<td>57</td>
</tr>
<tr>
<td>$\chi^2$ statistic</td>
<td>16.451</td>
<td>35.122</td>
<td>44.671</td>
<td>1.121</td>
<td>29.037</td>
</tr>
</tbody>
</table>

Standard errors are in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
the relative stability of fundraising flows from one period to another. For all candidates other than Forbes, the autocorrelation parameter was between .44 and .61. Gramm had the highest coefficient, partial evidence that his fundraising results were the most stable. His campaign was credible and well financed but never gained the electoral momentum to threaten the leader Dole, so this result is logical. Steve Forbes’ decision to self-finance his campaign may explain why his AR(1) coefficient was the only insignificant result. While the estimations reported above do not include Forbes’ self-funding, because he was self-funding, he received very few contributions from individuals. It is not surprising that those contributions would be were irregular. Further, Forbes’ sample in this estimation is very small—only eight weeks. It is not surprising that the estimated parameters for his model are not significant.

Only Buchanan’s contribution flows were statistically significant in their relation to the probability of victory at better than the 5% level. The results suggest that for every 1% increase in the likelihood Buchanan won the nomination, he raised more than 0.5% more in funds (per week). For example, in early February, even before Buchanan won the New Hampshire Primary, his contract shares increased by 48%, from $5.6 to $8.3. This implies that his contributions, which had been approximately $45,000 in the week before the increase should have increased to more than $65,000 the week after. To the contrary, the lack of relation among the other candidates and their probability of victory measures implies that other candidates were unaffected by dips in their probability of victory. For example, Dole’s fundraising was

\[11\] Though outside of the scope here, it would be interesting to study in further detail decisions by Forbes and other self-financed candidates about contributions to their own campaigns. What sort of a model did Forbes or Mitt Romney follow on personal contributions? Did their decision to drop-out come earlier or later than it would have, had they been soliciting funds from individuals?

\[12\] The interpretation of this log-log model implies a percentage increase in the probability of victory, not a percentage point increase.
unaffected when he fell from $49 to $43 in August 1995 and from $62 to $49 just before his loss in the New Hampshire Primary. Alexander’s elasticity is positive, though barely significant at the 10% level, which is tenuous evidence that his fundraising increased in the same manner as Buchanan’s following increases in his probability of victory.

### 3.4.2 Republican Nomination in 2000

George W. Bush, then Governor of Texas, broke many campaign fundraising records on his way to the Republican nomination in 2000. He raised more money in the year before the primaries than any other candidate in history and his status as the likely nominee was unchallenged for the duration of the campaign; the contract for him to win opened at $77.5 in June of 1999 and never fell below $70. With a huge war chest, national name recognition, and frontrunner status, most of his initial competition, including former Vice President Dan Quayle and Elizabeth Dole, now Senator from North Carolina, were forced from the race before the first primaries. Only Steve Forbes, again self-financing his campaign, and Senator John McCain (R-AZ) seriously challenged Bush for the nomination during 2000, though Forbes pulled out of the race by February, after spending another $38.7 million of his own money. McCain, with a surprise victory in the New Hampshire Primary on February 1, 2000, received a boost in his national numbers (and on the IEM) as well as in his fundraising. However, it was never enough to dislodge Bush from his position as the presumptive nominee. Figures 3.3 and 3.4 present the fundraising flows for the major candidates as well as the IEM prices. Table 3.3 shows the ARIMA estimation results.

In the models of the 2000 Republican nomination process, the first surprising result is the relative insignificance of the AR(1) term. Dole’s
Figure 3.3

Table 3.3  2000 Republican Fundraising ARIMA

<table>
<thead>
<tr>
<th></th>
<th>Bush</th>
<th>Dole</th>
<th>Forbes</th>
<th>McCain</th>
<th>Quayle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of Victory</td>
<td>1.290</td>
<td>.964</td>
<td>-.360</td>
<td>1.430***</td>
<td>.929</td>
</tr>
<tr>
<td></td>
<td>(2.362)</td>
<td>(.698)</td>
<td>(.425)</td>
<td>(.452)</td>
<td>(1.049)</td>
</tr>
<tr>
<td>Republican Price</td>
<td>-.014</td>
<td>-.117</td>
<td>.011</td>
<td>.004</td>
<td>.143</td>
</tr>
<tr>
<td></td>
<td>(.041)</td>
<td>(.185)</td>
<td>(.052)</td>
<td>(.125)</td>
<td>(.296)</td>
</tr>
<tr>
<td>Days to Convention</td>
<td>.005*</td>
<td>-.003</td>
<td>.013***</td>
<td>-.014</td>
<td>-.0002</td>
</tr>
<tr>
<td></td>
<td>(.003)</td>
<td>(.008)</td>
<td>(.004)</td>
<td>(.010)</td>
<td>(.022)</td>
</tr>
<tr>
<td>Constant</td>
<td>7.393</td>
<td>16.711</td>
<td>6.498***</td>
<td>11.393*</td>
<td>2.723</td>
</tr>
<tr>
<td></td>
<td>(10.669)</td>
<td>(10.678)</td>
<td>(2.009)</td>
<td>(6.352)</td>
<td>(22.006)</td>
</tr>
<tr>
<td>AR(1)</td>
<td>.253**</td>
<td>.093</td>
<td>.689***</td>
<td>.514*</td>
<td>-.311</td>
</tr>
<tr>
<td></td>
<td>(.110)</td>
<td>(.499)</td>
<td>(.208)</td>
<td>(.304)</td>
<td>(.278)</td>
</tr>
<tr>
<td>N</td>
<td>58</td>
<td>17</td>
<td>33</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>$\chi^2$ statistic</td>
<td>18.771</td>
<td>4.425</td>
<td>50.461</td>
<td>18.284</td>
<td>2.675</td>
</tr>
</tbody>
</table>

Standard errors are in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Figure 3.4

and Quayle’s fundraising flows seem unaffected by the previous week’s fundraising totals and even Bush’s significant autocorrelation parameter is only .253, much lower than the AR(1) terms in other nomination campaigns. McCain’s fundraising flow is relatively stable (the parameter is .514) but it is only significantly different from zero at the 10% level. Forbes, meanwhile, whose fundraising had an insignificant autocorrelation parameter in 1996, has a high parameter in 2000. The first note of caution, with all the results from this nomination race, has to do with the relatively short time period. The model is built from the beginning of trading in the IEM market, which for this nomination cycle opened in June (rather than January or February for other nomination races) of the year before the primaries. Further, because Dole, Quayle, and Forbes all dropped out well before the convention, their series are generally much shorter than the series analyzed in the 1996 Republican
nomination race. Bush’s fundraising may exhibit strange behavior because at some point during the nomination campaign, his fundraising became directed towards raising money for the general election. This switch may be biasing these results, which use data on only primary funds.

The fundraising flows for McCain responded positively to changes in his probability of victory. The elasticity of his fundraising with respect to his nomination prospects was very high at 1.43. For example, when his probability of nomination more than doubled after his New Hampshire victory (from $12.4 to $27.8), that implies an increase in fundraising flows of 150%. However, this elasticity works both ways—following his defeat in the South Carolina primary and the crash of his nomination contract price to $18.50 from $32.30, the model predicts that McCain’s fundraising will be cut in half. Like the previous model, none of the candidates’ fundraising flows seemed to respond to changes in the expectations about Republican strength in the 2000 elections (measured by the probability Republicans would capture a majority in the United States House).13

3.4.3 Democratic Nomination in 2000

Vice President Al Gore announced his intention to seek the Democratic nomination for the presidency in June 1999. According to the Philadelphia Inquirer, however, Gore had not planned to make his formal announcement until September 1999, but to fundraise more effectively, he was forced to announce earlier.14 Many prominent Democrats were rumored to be considering a challenge of the sitting Vice President but only Senator Bill

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13 Estimations using the probability of Republicans to win a majority in the House had similarly insignificant results.
Bradley (D-NJ) entered the race. Bradley posed a serious threat to Gore, running to the left of the centrist Democrat, but Gore’s name recognition and fundraising ability, both augmented by his position as Vice President, enabled him to stave off the challenge and wrap up the nomination without losing a single primary or caucus challenge. Figures 3.5 and 3.6 depict the money race and the market prices. Table 3.4 with estimation results follows.

Despite Gore’s well-established position, the estimation results for the AR(1) term imply that his fundraising totals each week had less relation to the totals in the week prior than did Bradley’s weekly totals. Both, however, are significant and in approximately in the same ranges as the estimations for the Republican race in 1996.

Confirming our expectations about the elasticity of fundraising with respect to nomination probabilities, the fundraising flows for the presumptive nominee
Figure 3.6

Table 3.4  2000 Democratic Fundraising ARIMA

<table>
<thead>
<tr>
<th></th>
<th>Bradley</th>
<th>Gore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of Victory</td>
<td>.834**</td>
<td>2.409</td>
</tr>
<tr>
<td></td>
<td>(.347)</td>
<td>(1.705)</td>
</tr>
<tr>
<td>Republican Price</td>
<td>-.015</td>
<td>-.158**</td>
</tr>
<tr>
<td></td>
<td>(.035)</td>
<td>(.067)</td>
</tr>
<tr>
<td>Days to Convention</td>
<td>.003</td>
<td>.014***</td>
</tr>
<tr>
<td></td>
<td>(.002)</td>
<td>(.003)</td>
</tr>
<tr>
<td>Constant</td>
<td>9.772***</td>
<td>5.074</td>
</tr>
<tr>
<td></td>
<td>(1.734)</td>
<td>(7.802)</td>
</tr>
<tr>
<td>AR(1)</td>
<td>.421***</td>
<td>.392***</td>
</tr>
<tr>
<td></td>
<td>(.159)</td>
<td>(.141)</td>
</tr>
<tr>
<td>N</td>
<td>37</td>
<td>60</td>
</tr>
<tr>
<td>$\chi^2$ statistic</td>
<td>20.508</td>
<td>59.417</td>
</tr>
</tbody>
</table>

Standard errors are in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Gore (whose IEM contract never fell below $61) do not respond in a significant way to changes in his probability of victory. For Bradley, meanwhile, the parameter is significant. We would expect the drop in his nomination odds from $34.90 to $27 in October-November of 1999 to lead to a reduction in his fundraising of about 3.4% (or a fall of nearly $20,000 per week). Both candidates have the expected signs with respect to our political climate control variable: as the probability that the Republicans would control the House rose, contributions to Gore and Bradley fell. However, only Gore’s climate parameter is significant. Of course, we cannot definitively conclude that this effect is the result of viability in the general election through the climate parameter. It may be a substitution effect: a well-informed Democratic contributor worried about losing seats in Congress to Republicans may shift contributions to House candidates and away from the Democratic Presidential nomination process (where the end result would be the nomination of one or another Democrat). Still, it is interesting to note that the positive term on this series is significant for Gore but not for Bradley. Assuming the interpretation has more to do with climate, it follows that the front-runner’s contributors care about the general election more than the nomination.

Finally, both candidates are expected to raise less money as the convention approaches. This follows a suggestion in the organizational model that campaigns do the bulk of their fundraising early and from their committed base. However, only Gore’s coefficient is significant, and both are quite small in magnitude (Gore raised only 1.4% less each day as the campaign progressed—far less in magnitude than other estimated parameters).
3.4.4 Democratic Nomination in 2004

For the first time since 1992, the Democratic Party began a nomination season without a clear frontrunner, as neither a sitting (or former) President nor Vice President entered the race. Vermont Governor Howard Dean enjoyed early and widespread popular support, though Massachusetts Senator (and eventual nominee) John Kerry was seen as a very strong contender as well—Kerry’s contract on the IEM opened at $34.30. Senator John Edwards (D-NC) raised a then-record $7.4 million in the first quarter of 2003. Senator Joe Lieberman (D-CT) had the name recognition from his run as Gore’s Vice Presidential nominee in 2000 and House Leader Dick Gephardt (D-MO) had a strong organizational base in Iowa. Adding to the confusion, General Wesley Clark declared his candidacy late in the process and immediately emerged as one of the key candidates. Ultimately, Kerry’s big wins in Iowa and New Hampshire propelled him to the nomination—though it may have been his impressive fundraising tallies (Kerry raised nearly as much as Dean in 2003 and much more in early 2004) that determined the race.

Estimation results from this race need to be carefully examined. Three major candidates (Dean, Edwards, and Clark) emerged on the scene late. As a result, their contracts were not traded on the IEM for the duration of the contest. Dean’s contract was split off from the rest of the field contract on September 19, 2003, Clark’s on October 13, 2003 and Edward’s on January 23, 2004. While it would be possible to use the “rest of field” (ROF) contract to proxy for the nomination probabilities of these candidates before their contracts spun off, it is not clear that there would be a way to disentangle the portions of the ROF price due to each candidate. Figure 3.7 shows the rest of the field contracts and subsequent spin-offs. When Dean is spun off, the rest of the field contract falls by 50% but remains in the $25 range until the Clark contract is spun off a
month later. The contract then declines to less than $5, but surges again in early January 2004 before the Edwards contract is spun off. With this price history in mind, we proceed to the results section. We drop any analysis of Clark and Edwards due to a short time-series. Though we include the small series for Dean, we do not attempt to use the rest of the field contract to proxy for Dean’s probability of victory; instead we begin his series when his contract is spun off onto the market. Figures 3.8 and 3.9 display the prices on contracts on the IEM and the flow of funds for the entire field. Table 3.5 presents the ARIMA estimation results.

Only John Kerry’s autocorrelation parameter is statistically significant, and its value is in line with previous AR(1) term results (from the 1992 RNC and 2000 DNC). As for the elasticity of funds with respect to electoral conditions, it appears that only Dean’s fundraising responded significantly to increases in the
Figure 3.8

Figure 3.9
Table 3.5  2004 Democratic Fundraising ARIMA

<table>
<thead>
<tr>
<th></th>
<th>Dean</th>
<th>Gephardt</th>
<th>Kerry</th>
<th>Lieberman</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of Victory</td>
<td>0.582</td>
<td>.662</td>
<td>0.627</td>
<td>-0.387</td>
</tr>
<tr>
<td></td>
<td>(0.183)</td>
<td>(0.662)</td>
<td>(0.382)</td>
<td>(0.664)</td>
</tr>
<tr>
<td>Days to Convention</td>
<td>-0.007</td>
<td>-0.001</td>
<td>-0.006</td>
<td>0.007</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>Constant</td>
<td>12.543</td>
<td>10.815</td>
<td>12.757</td>
<td>10.160</td>
</tr>
<tr>
<td></td>
<td>(1.474)</td>
<td>(1.548)</td>
<td>(1.168)</td>
<td></td>
</tr>
<tr>
<td>AR(1)</td>
<td>-0.112</td>
<td>-0.055</td>
<td>0.441</td>
<td>0.154</td>
</tr>
<tr>
<td></td>
<td>(0.198)</td>
<td>(0.240)</td>
<td>(0.132)</td>
<td>(0.164)</td>
</tr>
<tr>
<td>N</td>
<td>21</td>
<td>46</td>
<td>74</td>
<td>49</td>
</tr>
<tr>
<td>$\chi^2$ statistic</td>
<td>19.717</td>
<td>2.078</td>
<td>21.008</td>
<td>3.781</td>
</tr>
</tbody>
</table>

Standard errors are in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

probability of nomination. These results imply that after the infamous “Dean Scream” the night of the Iowa Caucuses, when Dean’s price on IEM fell from $57.80 to $13, his contributions would have been expected to fall by more than 200%. The model also implies that both Kerry’s and Dean’s contributions increased as the campaign continued. For Dean, this parameter estimate might imply that as the process went along his status and notability grew and thus more contributors were willing to contribute. More, because the Dean series is right-censored at his drop-out, the coefficient does not necessarily imply that he was at his highest contribution point closest to the nomination, but rather that his fundraising increased as the race continued until his withdrawal.

3.5  Implications for the Models of Campaign Fundraising

Though the results from the preceding estimations are noisy, there are a few noticeable trends. For one, it seems clear that the current nomination probability of front-running candidates (those who dominate throughout the season both financially and in probability of victory—Bush and Gore in 2000,

15With a linear model, this implication may be stretched.
Dole in 1996) does not have an effect on their fundraising flows. Long-shot or insurgent candidates (Buchanan in 1996, Bradley and McCain in 2000) who do gain some momentum are able to turn that momentum into fundraising gains, while others show no relation between their fundraising and probability of victory. This elasticity of funds with respect to electoral expectations, however, is a double-edged sword. These momentum fueled candidates can benefit from expectation increases, but their funding can also take major hits from drops in their probability of victory.

There is some evidence that front-runners respond to changes in the broader fortunes of their party (Gore in 2000), but the evidence is not overwhelming. It is also unclear, as mentioned earlier, whether these parameter estimates imply that rising political climates fuel more donations for the front-runners or if it is evidence of a more strategic substitution by partisan contributors between presidential candidates and those running for other offices. As Brown Jr. et al. (1995) suggest, contributors are overwhelmingly partisan, well-informed, and likely to donate to multiple candidates in different races.

3.6 Interrupted Time Series Analysis

As Hinckley and Green (1996) note, the ARIMA specification may not be the best way to test econometrically the contribution data for evidence of the momentum model. Rather, we might want to isolate specific campaign events such as early straw polls, other candidates’ drop-outs or major primaries and caucuses, which we would expect to generate momentum for a campaign, and test to see if these events had effects on campaign’s fundraising flows. One issue in identifying these events after the fact, would be a bias towards selecting events that we know did have an effect on the campaign. However, because our interest is in the effects of these events on fundraising rather than their
effects on the campaign as a whole, it is not clear that this bias is an issue. The momentum model relies on electoral momentum influencing finances and testing only instances of true electoral momentum may make for a cleaner identification of this process.

To test the effect of specific events on the fundraising flows, we follow the interrupted time-series techniques presented by McDowall et al. (1980) and Wei (2006). Perhaps the most interesting results would be tests of the effects of early voting events (the Iowa Caucus, the New Hampshire Primary and Super Tuesday) on fundraising. Examining the effect of these early votes on voting behavior in later contests, Knight and Schiff (2007) find that voters in Iowa or New Hampshire have as much as 20 times the influence of later voters because candidates acquire significant momentum from early performances. In their own event study, Hinckley and Green (1996) find that in the 1988 nomination races few election events had significant effects on candidate fundraising flows and even those that were significant lasted only a week. Only Jesse Jackson’s fundraising provided evidence of a prolonged fundraising momentum effect. According to their results, Jackson’s contributions increased by $341,000 the week after his surprising (and impressive) performance on Super Tuesday, and the momentum ultimately earned Jackson nearly $2 million in excess contributions (20% of his total).

However, in this study, we are unable to test the effects of these events on fundraising. For one, because these events come in such rapid succession, it would be difficult to estimate properly the unique effect. Super Tuesday is no more than a month after the Iowa Caucus in our sample, with the New Hampshire Primary in between. Moreover, most candidates (other than the eventual nominees) drop out during or shortly after the events. In turn, their fundraising efforts and our time-series end as well. For proper interrupted
time-series analysis, we need more than a few weeks following the event to properly gauge its effect. For the candidates who do not drop out—usually only the eventual nominee—while there would be enough data following the events to measure the impact, the interpretation is less obvious. These candidates are no longer competing in primaries but instead gearing up for the general election. In addition, it is not clear whether any effect is due to the primary, the drop-out of rivals, or winning the nomination.

Instead of relying on the first primaries and caucuses, we use pre-election year straw polls and major candidate based events. For Republicans, the media focuses on a number of straw poll events in the year before the nomination (in Iowa, Arizona, and other states) and we test the impact of these early signals of electoral quality. We also test the effect of candidate withdrawals from the race on the finances of the other candidates remaining in the race. In addition, for a number of the contests in the sample, a major potential contender (Colin Powell in 1996 or Hillary Clinton in 2004) made an announcement that he or she was not seeking the nomination. We also test the effects of these events.

Hinckley and Green (1996) test for the effect of campaign events in the 1988 nomination contests and they find that not a single event was significant.\(^\text{16}\) Each event is modeled as a pulse function which takes a value of one the week of the event and zero for all periods before and afterwards. We assume, given the clear signal about electoral conditions provided by these events, that the impact of an event is abrupt and of uncertain duration.\(^\text{17}\) The estimation yields both an onset parameter and duration parameter. The onset parameter expresses the magnitude of the initial effect of the event on fundraising. The

\(^{16}\)The events include Gary Hart’s exit and re-entry into the race and the Joe Biden plagiarism scandal, though these specific tests are not described in detail.

\(^{17}\)The other possibility would be a gradual and permanent effect of the event. This seems less likely on both the onset and duration sides. Our results, which very rarely indicate decay parameters close to unity, also support this specification.
duration parameter, expressed as the percentage of the onset parameter’s effect still felt in future weeks, measures the exponential rate of decay of the effect. In the limit, a duration parameter of one implies a permanent effect.

The political science literature on primary campaigns is very relevant, both in our selection of events and in our expectations about the estimated results. Similar to our results in the preceding section, we might expect the effects of the events to be different for front-running candidates and for long-shot candidates. According to Gurian and Haynes (2003), well-known and well-financed candidates do not receive the same magnitude electoral boosts from primary performances as do long-shots. Steger (2007) addresses the differences between Democratic and Republican nominations, arguing that winning primary victories are significant for Democrats while early endorsements (such as straw polls) matter most to Republicans. Moreover, Republican races tend to be decided sooner and so earlier candidate events may be more significant for the Republicans than Democrats.

We begin the event study with the 1996 Republican nomination race. The straw poll and candidate events we focus on are presented in Table 3.6. There were six major straw polls in 1995, though two occurred in January, either before the IEM opened or too soon after to be used in testing. Of the four other straw polls, only Arizona was a major surprise, with Pat Buchanan defeating Phil Gramm. Most other candidates, including the front-runner Bob Dole, did not compete. The other notable poll was in Iowa, where Gramm tied Dole and the press anointed Gramm as Dole’s most serious challenger (months after discounting him following his loss to Buchanan in Arizona).

The other major storyline for the Republicans in 1995 was whether or not General Colin Powell, the former chairman of the Joint Chiefs of Staff, would seek the nomination and, if he did, whether he would do so as a
Table 3.6 1996 Republican Nomination Fundraising Event Study

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr 9, 1995</td>
<td>Oklahoma Straw Poll</td>
<td>Phil Gramm wins</td>
</tr>
<tr>
<td>Apr 24, 1995</td>
<td>Arizona Straw Poll</td>
<td>Buchanan wins in a surprise</td>
</tr>
<tr>
<td>Aug 19, 1995</td>
<td>Iowa Straw Poll</td>
<td>Dole and Gramm tie</td>
</tr>
<tr>
<td>Sep 17, 1995</td>
<td>Powell Announces</td>
<td>General Colin Powell announces that he <em>would</em> run as a Republican</td>
</tr>
<tr>
<td>Nov 8, 1995</td>
<td>Powell Withdraws</td>
<td>General Colin Powell announces that he will not run for President</td>
</tr>
<tr>
<td>Nov 18, 1995</td>
<td>Florida Straw Poll</td>
<td>Dole wins in a close contest with Gramm and Alexander</td>
</tr>
</tbody>
</table>

Republican or an Independent (or even as a Democrat). Most polling in 1995 had Powell defeating President Bill Clinton both head-to-head and in a three-way race with Dole or any other unnamed Republican. Powell made news first in September on CBS, when he revealed that if he were to run, he would do so as a Republican. Many Republicans believed Powell’s possible candidacy limited their fundraising. After announcing his own withdrawal from the nomination race, Senator Arlen Specter (R-PA) noted that the “intense publicity and speculation” about Powell’s potential candidacy put a damper on Specter’s fundraising efforts. As he noted, the two shared a similar ideological base as centrist pro-choice Republicans.18 Two months later, however, Powell announced that he would not seek the nomination and, as the press reported, most Republican candidates were relieved.

The evidence from this interrupted time series analysis is noteworthy because most results are insignificant. To begin with, though the press (and many candidates) were very concerned about the straw polls, particularly the tie in Iowa in August and Buchanan’s surprise win in Arizona in April, none of the events had significant effects on fundraising for any candidate in the 1996 Republican nomination race. While the events may be *politically* important, as

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18 James O’Toole, “Specter plans to suspend presidential candidacy,” *Pittsburgh Post-Gazette*, November 22, 1995
Table 3.7  Interrupted Time Series of Dole’s Fundraising

<table>
<thead>
<tr>
<th>Event</th>
<th>Onset</th>
<th>T-Value</th>
<th>Duration</th>
<th>T-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powell a Republican</td>
<td>-0.934</td>
<td>-1.57</td>
<td>-0.585</td>
<td>-1.71</td>
</tr>
<tr>
<td>Powell Withdraws</td>
<td>1.195</td>
<td>2.12</td>
<td>0.928</td>
<td>9.85</td>
</tr>
</tbody>
</table>

All estimates significant at the 10% level or better

Steger (2007) argues, it is clear that they are not financially important.

Despite complaints from several long-shots and also-rans that Powell’s indecision in the fall of 1995 cost them donations or changed their spending strategy, only one candidate’s fundraising was significantly affected by Powell’s two announcements (Table 3.7). The front-runner, Bob Dole, saw his fundraising flow fall by 93% when Powell announced he would run as a Republican in September 1995. Two months later, with Powell’s non-entry, Dole’s funds increased by 120%. The very high duration parameter for Powell’s withdrawal (0.93) implies not only that Dole benefited from the event when it happened, but that it continued to boost his fundraising nearly for the duration of the contest as Dole’s fundraising remained more than 10% higher than preintervention levels for thirty weeks.

The 2000 Republican Nomination race was less dramatic than the 1996 contest. There was no Powell, weighing whether or not to join the fray and polling better than the candidates already competing. In addition, Bush jumped out to early leads in fundraising and in the polls. Until McCain’s surprising win in New Hampshire, it did not appear that any candidate would be able to challenge the former President’s son. Even McCain’s surge only decreased Bush’s probability of victory to a 67% chance of nomination. The only straw poll event available for interrupted time series analysis is the Iowa Straw Poll in August 1999. Bush won the event with 31% of the vote; Forbes was second with 21% and Dole was third with 14% (McCain did not participate). However, the 2000 nomination does allow for the testing of the
effects of early exits from the race on the fundraising of other candidates. Former Vice President Dan Quayle quit the race in September, and Dole suspended her campaign in October.

We run the interrupted time-series analysis for both Bush’s and Forbes’ fundraising flows. However, neither model converges. When we remove the Iowa Straw Poll event dummy, we find that neither Quayle’s nor Dole’s drop-out had any effect on either candidate’s fundraising. When we run the model only with the Iowa Straw Poll, again the model does not converge. Likely, this is due to the early timing of the straw poll, relative to when this market opened. Though these results are not as robust as the previous findings, the implication seems to be that neither candidate’s fundraising responded to the withdrawal of their rivals.

The 2000 Democratic primary between Gore and Bradley was as lacking for events as its Republican counter-part. The time between Bradley’s exit in early March and the Iowa Caucus in mid-January does allow for a test of the effects of that event. However, as the New Hampshire Primary followed only a week later, we must be careful in interpreting the results on the Caucus event—rather than the change in fundraising flows due the Iowa results, it may be more appropriate to consider the results as the change in fundraising due to the beginning of the actual primary season. In either case, the onset and duration parameters for both Gore and Bradley were insignificant.

Finally, we consider the 2004 Democratic primary. Like the 1996 Republican

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**Table 3.8  2000 Republican Nomination Fundraising Event Study**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 14, 1999</td>
<td>Iowa Straw Poll</td>
<td>Bush wins</td>
</tr>
<tr>
<td>Sep 27, 1999</td>
<td>Quayle Quits</td>
<td>Quayle has little support and less money</td>
</tr>
<tr>
<td>Oct 20, 1999</td>
<td>Dole Quits</td>
<td>Dole quits, noting that Bush and Forbes are able to outspend her eighty to one</td>
</tr>
</tbody>
</table>
race, there was a strong potential challenger with uncertain intent. In fact, in 2000, there were two such contenders: Al Gore and Hillary Clinton. While Gore announced his decision not to run in December 2002, Clinton did not make her intentions public until May 31, 2003. Given the effect observed earlier of Powell’s announcements on Dole’s fundraising, we might expect front-runner Kerry to pick up additional funds thanks to Clinton’s decision. However, neither Kerry’s nor Gephardt’s fundraising flows reacted to the Clinton news.19 Only the fundraising of Lieberman had a significant response to Clinton’s announcement in May 2003. Lieberman’s funds increased by 128% in what was, essentially, a permanent effect (the duration parameter was not significantly different from one). It is important, however, to keep in mind the context of this event; the Hillary Clinton who announced she was not running was not the same candidate that ran for president in 2008 as the inevitable Democratic nominee. At the time, she had served only four years in the Senate and in head-to-head polls consistently lost to President George W. Bush by 2 to 1 margins. More, polls showed that only 8% of Democratic voters thought she would be the toughest opponent for Bush. This analysis also suggests that Lieberman and Clinton may have drawn similar donors, perhaps through the use of the same donation lists as the Clinton-Gore campaigns of the 1990s.

19 As noted earlier, with late announcements, the series were much shorter for Edwards, Dean, and Clark and could not be estimated.
3.7 Conclusion

The interrupted time series results suggest that early straw polls do not have a significant effect on Republican fundraising efforts. In addition, it does not appear that the drop-outs of minor candidates from the races have a significant effect on other candidates’ funds. Finally, perhaps the most interesting result is the case of Colin Powell in 1996. While most Republican challengers for the nomination were convinced that Powell’s potential candidacy was wreaking havoc on their fundraising, only front-running Dole’s fundraising actually responded to Powell’s two announcements (and in very significant ways). Though this does not square with the results from 2004, the implication is that the contributors to the front-runner do react to electoral conditions, but that they perceive the greatest threat to the front-runner as coming from potential big name candidates rather than challengers already in the race.

In many ways, the results from this chapter underline the importance of the ex ante determination of which candidates are the perceived front-runners and which are the long-shots. The front-runners’ finances do not swell with increases in their probability of victory, but perhaps more importantly they do not fall in the face of political trip-ups. However, it is clear that these front-runners’ finances are not immune from all electoral events. As the Colin Powell effect on Bob Dole’s fundraising in 1996 showed, the possibility that a candidate would be dislodged from the status of front-runner could have an effect on his or her finances. The results also suggest that there are two types of long-shot candidates. There are candidates like Bradley or McCain who successfully emerge to challenge front-runners (either by winning primaries or by closing the gap in probability of nomination). During their challenge, their fundraising is very elastic with respect to probability of nomination. But for the majority of the initial long-shots—candidates like Gramm or Lieberman—their
fundraising is not systematically related to their probability of victory. These candidates are clearly never able to develop a positive feedback loop between money and momentum.
CHAPTER 4

Base and Non-Base Contributions

Early in 2004, The Washington Post reported on the donation bases for candidates for the Democratic nomination. According to the demographics research firm Claritas, while many of the candidates’ bases had overlaps, there were striking differences in contributors. Howard Dean tapped groups like the “Bohemian Mix” and the “Up and Comers,” while John Kerry had strong support among the “Young Digerati” and the “Money and Brains.” Dick Gephardt, meanwhile, raised his money from the “Urban Elders” and “New Empty Nests,” both more traditional Democratic constituencies. Claritas argued that these differences could help explain fundraising and electoral success among the candidates.\(^1\) During the race, Dean’s campaign was lauded for developing a netroots contribution base, using the internet to solicit new donors, especially those who had never made political contributions in the past. But after the implosion of the Dean campaign in Iowa, the media began to question whether the netroots strategy had led to his undoing. Were these nontraditional donors a more elastic source of funds that quickly abandoned Dean when his electoral strength evaporated?

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The news media and political campaigns worry constantly about candidates and their bases, whether the base is a geographic or an ideological construct. Candidates are either in need of reaching out to voters (or contributors) outside of the base, or they need to solidify support within their own base. Given the divided and bipartisan nature of American politics, it is very difficult for candidates to win any race without both the support of their base and at least some support from outside their base. For fundraising, the situation is less clear. One of the two models of fundraising discussed in the previous section, the organizational model, proposes that candidates mine their base during the course of a campaign for donations and do not waste funds or efforts in soliciting outside of the base (Hinckley and Green 1996). The momentum model, meanwhile, downplays the importance of the candidates’ base and implies that a candidate can use electoral momentum to energize contributors (both in and out of of the candidate’s original political base) (Bartels 1988).

The literature on PAC contributions suggests that heterogeneity between PACs (and the interaction of this heterogeneity with candidates qualities) is an important part of contribution decisions. This heterogeneity is usually on the preferences or characteristic level. For individuals, we are more limited in the heterogeneity that we can observe in the contribution data. However, it makes sense that location in a candidate’s base is an important source of difference between contributors. Gimpel et al. (2006) note that most campaign contributions are solicited through networks of donors. These networks are likely to be geographic because the “barriers of distance” are smaller. Gimpel et al. (2006) theorize that politicians “capitalize on the social relations grounded in physical places in order to elicit contributions.”

In the previous chapter, we found that some candidates’ fundraising totals

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2 McCain’s run for the Republican nomination and then the White House in 2008 is the most recent example.
are very elastic with respect to their probability of victory, while others are not. Moreover it appears that the divide is not random. The funds of front-running candidates, such as Dole in 1996 or Gore in 2000, do not respond to changes in their electoral conditions. Some long-shots or insurgents, such as Buchanan in 1996 or McCain and Bradley in 2000, do have elastic funds and, while there are others that do not (Gramm in 1996 or Lieberman and Gephardt in 2004), it is these candidates with responsive funds that most often provide the strongest challenges to the front-runners. The first step in understanding these differing elasticities is to understand more about the fundraising itself; that is, we attempt to treat previously unidentified heterogeneity in contributions by location in an effort to better understand the effects of political conditions on fundraising.\(^3\)

In this chapter, we propose a way of defining candidate’s financial bases. Then, we use the same exclusion restriction from the preceding section to estimate ARMAX models and the determinants of fundraising flows for candidates, both from their bases and from outside of their bases. In assessing the implications of these models, we will examine whether the increases in contributions following increases in probability of victory come from a re-energized base or from new contributors from outside of the base. This work should help to shed light on questions that remain despite the previous section. For one, what determines front-runner and long-shot status? Does it have to do with a candidate’s ability to appeal outside of his or her base, both politically and financially or does it have to do with the ability (or the resources) to mine the original base in an efficient and effective way to fund a campaign? The results suggest that for some front-runners, while their base is

\(^{3}\) Political conditions may be either the elasticity of funds with respect to probability of victory or with respect to political conditions, as measured by probabilities about the party taking the Congress or the Presidency.
still unresponsive to changes in their probability of victory, donors outside their base are compelled to contribute with improving electoral conditions. For long-shots that had had a significant relationship between their probability of victory and their fundraising flows, most showed evidence of elastic contributions from both their base and non-base contributors, but usually the base was more responsive to electoral condition changes than the non-base. For the other candidates, for whom electoral conditions did not have an effect on fundraising, this remained the case for both base and non-base donors. Further, for some front-runner candidates there was slight evidence that base donors’ contributions depended on the overall political climate.

4.1 Defining the Bases

To study the differentiated responses by bases, we first need to define a politician’s home-base. There is not a consensus definition of political or financial base in the campaign finance literature. Methods have included home states or researcher assumptions about a candidate’s likely supporters based on politics or identity. Anecdotal evidence suggests that candidates turn first to their home states for contributions: Dukakis in Massachusetts (Wilcox 1991) and Gore in Tennessee in 1988 (Brown Jr. et al. 1995). Other candidates, with experience as party officials or with high-ranking congressional offices, may turn to more national bases and Washington donors, such as Gephardt and Bob Dole. Finally, Brown Jr. et al. (1995) notes that religious or cultural communities may serve as political bases; for example, Pat Robertson solicited a ready-made network of donors from his television ministry in 1988. These examples suggest that the most obvious measure, using home state, is overly simplified. Not only

4 The exception here was former Vice President Dan Quayle in the 2000 Republican Nomination. However, due to the short series length, it is not clear how significant this result is. In addition Quayle’s base was one of the largest, in terms of number of areas in it.
would this measure incorrectly enlarge the bases of candidates from larger states, but it also deals in an awkward manner with Washington, DC based candidates like Dole in 1996 or Gore in 2000 or with candidates with broad, non-geographic support like Robertson.

Hinckley and Green (1996) define bases as “the three-digit zip code areas accounting for two-thirds of funds raised in the first 24 weeks of active campaigning, plus certain specific locales thought to be important to individual candidates.” Though this definition begins as a rigorous one, the inclusion of these other districts is more *ad hoc*. In 1988, southern and western suburban areas are expected to be part of Robertson’s base while large central cities are part of Jesse Jackson’s base, regardless of actual contribution tallies. In this chapter, we devise our own measure of base for each candidate that relies solely on the contribution data rather than *ad hoc* political assumptions. We aggregate contributions to the three-digit zip code level and find the regions responsible for half the candidate’s contributions in the first quarter of the year before the general election.

Though zip codes are not perfectly geographically distributed, they follow a simple pattern. The first digit represents a number of states (for example, a leading 4 signals that the state is Michigan, Indiana, Ohio or Kentucky). The next two digits are the region within that state group, usually centered on a major city (for example, 432xx is a zip code centered on the postal hub of Columbus, OH). These three-digit zip codes represent United States Postal Service sectional center facilities. The final two digits, which identify cities or towns individually, are dropped in our aggregation. We use the contributions from the only the first quarter of the year before the general election (that is, 1995 for the 1996 Republican National Convention). As our interest is how the base (and the non-base) respond with donations during the course of the
campaign, it is important to identify the base early in the process—hopefully before campaign spending on fundraising distorts the picture of which areas are most likely to donate to a campaign. It may seem that using the first quarter of the prior year would be an issue in light of the fact that most candidates do not officially announce that they are running for president until much later in the election cycle. However, all candidates covered by the IEM in our sample, with the exception of General Clark in 2004, had a large number of contributions during the first quarter of the previous year.\textsuperscript{5} It is exactly these contributors (and their locations) that are obviously the candidate’s base. They were willing to support candidates not even formally running. In effect, this bias helps us to better define a candidates political (and financial) base.

It may be helpful to explain the base definition process with an example. Though Governor Lamar Alexander (R-TN) did not announce his candidacy for the Republican nomination in 1996 until February 28, 1995, he raised nearly $5 million from 6,000 contributors in the first quarter of 1995.\textsuperscript{6} In the first quarter, 21\% of his contribution dollars came from the three-digit zip code area 372, the USPS zone centered on Nashville, Tennessee. Alexander was, after all, the former Governor of Tennessee. His next most significant contribution area, as defined by total value of contributions, was the three-digit zip code area 381 with 11.5\% of his contributions. This USPS zone includes Memphis, TN. In all, four zip codes make up 50\% (cumulatively) of Alexander’s contributions in the first quarter of 1995 (three of which were in Tennessee). These regions are defined as his base. This is on the lower end—the average candidate in the

\begin{footnotesize}
\begin{itemize}
\item Clark, who did not collect his first donation until September 2003, is dropped from this section. However, as mentioned earlier, the short duration of his contract on the IEM also makes it difficult to analyze his candidacy at all so dropping this data is not a significant loss.
\item As discussed earlier, because the FEC database only records individual contributions over $250, these summary figures are only a subset of the total number of donations and the total value of the donations.
\end{itemize}
\end{footnotesize}
sample drew 50% of his or her contributions from 14 or 15 three-digit zip code areas. In many cases, the top three-digit zip code area is the largest city in the candidate’s home state (Dallas for Bush and Gramm, St. Louis for Gephardt or Phoenix for McCain). However, many others are not even within a candidates’ home state—for most Democrats, New York City is the largest fundraising hub (Bradley, Dean, Edwards, Gore, Kerry and Lieberman) and Washington, DC provided the most funds to Bob Dole’s 1996 campaign. The importance of the largest fundraising center is also varied in the sample. Whereas Alexander drew 22% of his first quarter fundraising from Nashville, Dan Quayle raised only 5.9% of his total from Evansville, IN, his top three-digit zip code. For this reason, we argue for taking the group of most important fundraising centers by cumulative size as the financial base rather than selecting the top several three-digit zip codes for each candidate. It should be noted that there is a significant overlap in the base rankings whether we use total funds (as we have) or total number of contributors. Table 4.1 presents basic information about the three-digit zip code bases.

Figures 4.1 and 4.2 present maps of the contributions by three-digit zip codes to Dole in 1996 and Gore in 2000 (maps for all other candidates are included in the appendix). The three-digit zip code areas which contributed more than 1.5% of the candidate’s total are highlighted. These generally illustrate the candidates’ bases, as defined above. A few interesting trends develop immediately. To begin with, as we might expect, most contribution bases are centered on major cities. Of course, these major cities are where the majority of the potential contributors live. Especially with limits on individual contributions, a large number of contributors are required to collect a large amount of money. Alternative methods, with controls for population or even median or mean income, resulted in outlier areas taking on significant
importance; for example, regions with very few people with a few contributors had extremely high per capita contributions, and it is not clear that those areas are actually more important to candidates’ finances than New York City or Washington, DC. If social or political network effects are important in encouraging contributions, it follows that bases are heavily urban (Gimpel et al. 2006).

Democrats tend to share all the same bases. New York City, Boston, Chicago, Palm Beach-Miami, Washington, DC, San Francisco and Los Angeles are all in the contribution bases of at least four of the seven Democrats in our sample.\(^7\) Aside from their home states, only Edwards has a significant number of contributions from outside those major metropolitan areas. For the Republicans, meanwhile, only Dallas, Houston, and Palm Beach-Miami are generally a part of most candidates’ bases. This may have more to do with the candidates in our sample: two Texans and a number of other Southerners in

\(^7\) In 1996, Bob Dole’s bases included all of the major Democratic cities except for San Francisco.
Figure 4.1

Figure 4.2
1996 and 2000. In addition, New York City (though difficult to see on the maps) is a part of every candidate’s base except for Bush and Alexander. Gimpel et al. (2006) study contributions to both parties and to all candidates for federal offices. They find that the contribution bases to Democrats and Republicans are quite geographically similar. Both are concentrated in densely populated and wealthy areas, especially the Boston-New York-Philadelphia corridor, Southern California and Chicago and Detroit. As Gimpel et al. (2006) note, 54% of Americans of voting age live in the top two deciles of population density and in 2004, 67% of Republican contributions and 79% of Democratic contributions (by volume) came from these locales.

4.2 Estimation Results

Now that we have defined and examined the candidates’ bases, we rerun the analysis from the previous chapter on two subsamples: the base and non-base contributions. Again, we use weekly data on total contributions from the FEC and prices from the IEM. Robustness checks using the weekly number of contributions rather than their monetary sum produced the same results. We appeal to the same exclusion restriction as in the previous chapter: fundraising is not likely to have an immediate effect on the probability of victory, but within a week probability of victory may have a more immediate effect on fundraising. With this restriction, we argue that we can make a causal interpretation. As in the previous chapter, all the fundraising flow data are best characterized as ARIMA (1,0,0). The model is:

\[(1 - \phi_1 B)C_t = \beta_1 V_{t-1} + \beta_2 P_{t-1} + \beta_3 D_{t-1} + \epsilon_t\]  

(4.2.1)
where the natural log of weekly contributions (either to the base or non-base) \( C \), is regressed on the AR(1) lag. Probability of victory, \( V \), is the natural log transformation of the IEM prices (to win $100). The political conditions variable, \( P \), and the number of days until the convention, \( D \), are defined as they were in the previous section. Again the model is run from the opening of the market until the candidates exit the race (or the nomination convention is held).

### 4.2.1 Republican Nomination in 1996

The ARIMA results in the previous section suggested that both Buchanan and Alexander had significant elasticities of funds with respect to probability of victory. The base results show that both Alexander and Buchanan received larger fundraising increases from their bases following probability of victory increases. In fact, Alexander’s non-base fundraising did not respond significantly to probability of victory increases at all whereas his base fundraising increased nearly 1% for each 1% increase in probability of victory.
Table 4.3  Non-Base 1996 Republican Fundraising ARIMA

<table>
<thead>
<tr>
<th></th>
<th>Alexander</th>
<th>Buchanan</th>
<th>Dole</th>
<th>Forbes</th>
<th>Gramm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of Victory</td>
<td>.540</td>
<td>.576***</td>
<td>-.194</td>
<td>.331</td>
<td>-.257</td>
</tr>
<tr>
<td></td>
<td>(.337)</td>
<td>(.175)</td>
<td>(1.652)</td>
<td>(1.515)</td>
<td>(.897)</td>
</tr>
<tr>
<td>Republican Price</td>
<td>.043</td>
<td>-.038</td>
<td>.051</td>
<td>.338</td>
<td>.121</td>
</tr>
<tr>
<td></td>
<td>(.112)</td>
<td>(.066)</td>
<td>(.057)</td>
<td>(.784)</td>
<td>(.999)</td>
</tr>
<tr>
<td>Days to Convention</td>
<td>.0002</td>
<td>-.0009</td>
<td>.0009</td>
<td>-.061</td>
<td>.0003</td>
</tr>
<tr>
<td></td>
<td>(.005)</td>
<td>(.003)</td>
<td>(.005)</td>
<td>(.103)</td>
<td>(.004)</td>
</tr>
<tr>
<td>Constant</td>
<td>8.399**</td>
<td>11.361***</td>
<td>9.686</td>
<td>8.270</td>
<td>5.998*</td>
</tr>
<tr>
<td></td>
<td>(3.579)</td>
<td>(2.324)</td>
<td>(7.788)</td>
<td>(12.625)</td>
<td>(3.580)</td>
</tr>
<tr>
<td>AR(1)</td>
<td>.423***</td>
<td>.460***</td>
<td>.648***</td>
<td>-.387</td>
<td>.573***</td>
</tr>
<tr>
<td></td>
<td>(.143)</td>
<td>(.103)</td>
<td>(.088)</td>
<td>(1.459)</td>
<td>(.132)</td>
</tr>
<tr>
<td>N</td>
<td>54</td>
<td>50</td>
<td>81</td>
<td>8</td>
<td>57</td>
</tr>
<tr>
<td>$\chi^2$ statistic</td>
<td>10.62</td>
<td>35.337</td>
<td>73.603</td>
<td>.87</td>
<td>22.212</td>
</tr>
</tbody>
</table>

Standard errors are in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Buchanan, meanwhile, received a slightly larger increase from his base than his non-base, but only by a tenth of a percent.

Dole, the eventual winner and long-time front-runner, has an interesting result not with respect to the elasticity of his contributions with respect to probability of victory, but with respect to the odds any Republican would win the White House. According to our results, his base responded with increased contributions to his primary campaign when the odds of Republican victory in November increased; when the probability of a Republican capturing the White House fell 10% in the beginning of August 1995 to $45, we would expect Dole’s fundraising to fall by 1.4%. The magnitude is not large, but at the time Dole was simply one of many contenders for the Republican nomination. Dole was the presumptive front-runner throughout the campaign, but it may also be the case that the response of donations to Dole’s campaign after Super Tuesday, when he had essentially cemented his role as his party’s nominee, is driving the relationship. However, this source of correlation seems unlikely: for one, the contribution data is restricted to donations made to the primary
campaigns and by FEC regulations that money cannot be spent on general election campaigning. Further, an estimation of Dole’s fundraising model ending on Super Tuesday had a similarly positive and significant coefficient. His non-base did not respond to such movements.

As noted earlier, Dole’s top three-digit zip code was not in his home state of Kansas, but in Washington, DC. This is not surprising for a long-time Senator; moreover, it is logical that donors from the capitol, presumably more aware of national trends and the ultimate goal of a presidential campaign (to win the White House), would be motivated to donate to the front-runner based on national party prospects. However, the DC three-digit zip code area accounted for only 5.6% of Dole’s contribution base. His base also included a varied list of major cities (New York, Boston, Chicago, Columbus, OH, Dallas, Houston, Denver and Los Angeles) and parts of his home state of Kansas. Still, Dole’s metropolitan collection of base areas may help explain why his base responded to changes in the climate while his non-base did not.

4.2.2 Republican Nomination in 2000

The caution used in interpreting these results in the previous section, based on the short time-period for all candidates other than George W. Bush and his runaway success, are still important in this section. That said, these results still provide valuable evidence in interpreting this nomination contest and implications for the determinants of fundraising flows. Starting with Bush, we see that his fundraising was more stable from his base than non-base, though both parameter estimates are relatively low compared to other results in this section. The Bush fundraising machine set a number of records during its march to unprecedented totals in the 1999-2000 election cycle, but perhaps it was more consistent with targeting base donors and that is evidenced by the
### Table 4.4  Base 2000 Republican Fundraising ARIMA

<table>
<thead>
<tr>
<th></th>
<th>Bush</th>
<th>Dole</th>
<th>Forbes</th>
<th>McCain</th>
<th>Quayle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of Victory</td>
<td>-.288 (2.606)</td>
<td>1.267 (.843)</td>
<td>-.620 (.821)</td>
<td>1.243* (.707)</td>
<td>1.307** (.591)</td>
</tr>
<tr>
<td>Republican Price</td>
<td>-.029 (.058)</td>
<td>-.061 (.124)</td>
<td>.167 (.158)</td>
<td>.107 (.155)</td>
<td>-.021 (.291)</td>
</tr>
<tr>
<td>Days to Convention</td>
<td>.003 (.003)</td>
<td>-.002 (.009)</td>
<td>.002 (.011)</td>
<td>-.015** (.008)</td>
<td>-.007 (.021)</td>
</tr>
<tr>
<td>AR(1)</td>
<td>.374*** (.113)</td>
<td>.298 (.412)</td>
<td>.663** (.295)</td>
<td>.301 (.339)</td>
<td>-.485 (.383)</td>
</tr>
<tr>
<td>N</td>
<td>58</td>
<td>17</td>
<td>21</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>$\chi^2$ statistic</td>
<td>20.005</td>
<td>4.705</td>
<td>6.035</td>
<td>15.532</td>
<td>11.531</td>
</tr>
</tbody>
</table>

Standard errors are in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

---

### Table 4.5  Non-Base 2000 Republican Fundraising ARIMA

<table>
<thead>
<tr>
<th></th>
<th>Bush</th>
<th>Dole</th>
<th>Forbes</th>
<th>McCain</th>
<th>Quayle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of Victory</td>
<td>1.424 (2.255)</td>
<td>.859 (.679)</td>
<td>-.231 (.429)</td>
<td>1.167** (.472)</td>
<td>.819 (1.221)</td>
</tr>
<tr>
<td>Republican Price</td>
<td>.012 (.037)</td>
<td>-.150 (.175)</td>
<td>.013 (.053)</td>
<td>.260*** (.082)</td>
<td>.230 (.316)</td>
</tr>
<tr>
<td>Days to Convention</td>
<td>.005* (.002)</td>
<td>-.003 (.009)</td>
<td>.012*** (.004)</td>
<td>-.021*** (.004)</td>
<td>.005 (.019)</td>
</tr>
<tr>
<td>Constant</td>
<td>5.573 (10.179)</td>
<td>18.315* (10.431)</td>
<td>6.530*** (1.999)</td>
<td>2.500 (3.747)</td>
<td>-3.787 (21.761)</td>
</tr>
<tr>
<td>AR(1)</td>
<td>.201* (.118)</td>
<td>-.025 (.502)</td>
<td>.624*** (.209)</td>
<td>-.107 (.272)</td>
<td>-.312 (.268)</td>
</tr>
<tr>
<td>N</td>
<td>58</td>
<td>17</td>
<td>33</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>$\chi^2$ statistic</td>
<td>16.171</td>
<td>3.939</td>
<td>56.255</td>
<td>33.247</td>
<td>2.547</td>
</tr>
</tbody>
</table>

Standard errors are in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%
higher stability.

McCain, the only candidate whose total fundraising significantly responded to changes in his probability of victory, again has large and significant elasticities for both his base and non-base. The magnitudes are very close, implying that McCain’s success upon his emergence as the only true competition for Bush or following his win in New Hampshire enabled him to raise more money both from his traditional supporters and from new donors outside of his base.

Surprisingly, former Vice President Quayle, who only lasted until September 1999 in the race, had a significant and very large elasticity of funds with respect to electoral conditions for his base. The estimations imply that a 1% increase in his chance of nomination would lead to a 1.3% increase in his weekly fundraising totals. However, the campaign was generally very difficult for Quayle. The proper example may be that when his likelihood of nomination fell in late June from 3% to 1%, his fundraising from his base would be expected to fall dramatically; his base was quick to limit its support when the going got tough.

### 4.2.3 Democratic Nomination in 2000

In the only one-on-one nomination contest in our subsample, the 2000 Democratic nomination campaign, we found that the fundraising of the front-runner, incumbent Vice President Gore, depended on national party conditions (as proxied by the probability of the Republicans to win the House). Though Gore’s base does not respond to changes in his probability of victory, we find that donors outside of his base are encouraged, with a very large magnitude, to contribute more when his probability of victory increases. Though this result is only significant at the 10% level, the coefficient implies that a 1% increase
### Table 4.6  Base 2000 Democratic Fundraising ARIMA

<table>
<thead>
<tr>
<th></th>
<th>Bradley</th>
<th>Gore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of Victory</td>
<td>1.084***</td>
<td>1.564**</td>
</tr>
<tr>
<td></td>
<td>(.354)</td>
<td>(2.072)</td>
</tr>
<tr>
<td>Republican Price</td>
<td>-.010</td>
<td>-.197***</td>
</tr>
<tr>
<td></td>
<td>(.039)</td>
<td>(.075)</td>
</tr>
<tr>
<td>Days to Convention</td>
<td>.003</td>
<td>.014***</td>
</tr>
<tr>
<td></td>
<td>(.002)</td>
<td>(.003)</td>
</tr>
<tr>
<td>Constant</td>
<td>7.226***</td>
<td>9.529**</td>
</tr>
<tr>
<td></td>
<td>(1.794)</td>
<td>(9.637)</td>
</tr>
<tr>
<td>AR(1)</td>
<td>.387**</td>
<td>.412**</td>
</tr>
<tr>
<td></td>
<td>(.171)</td>
<td>(.166)</td>
</tr>
<tr>
<td>N</td>
<td>37</td>
<td>60</td>
</tr>
<tr>
<td>$\chi^2$ statistic</td>
<td>23.055</td>
<td>63.027</td>
</tr>
</tbody>
</table>

Standard errors are in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

---

### Table 4.7  Non-Base 2000 Democratic Fundraising ARIMA

<table>
<thead>
<tr>
<th></th>
<th>Bradley</th>
<th>Gore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of Victory</td>
<td>.766**</td>
<td>2.805*</td>
</tr>
<tr>
<td></td>
<td>(.370)</td>
<td>(1.654)</td>
</tr>
<tr>
<td>Republican Price</td>
<td>-.016</td>
<td>-.140**</td>
</tr>
<tr>
<td></td>
<td>(.037)</td>
<td>(.063)</td>
</tr>
<tr>
<td>Days to Convention</td>
<td>.003</td>
<td>.015***</td>
</tr>
<tr>
<td></td>
<td>(.002)</td>
<td>(.003)</td>
</tr>
<tr>
<td>Constant</td>
<td>9.829***</td>
<td>2.031</td>
</tr>
<tr>
<td></td>
<td>(1.852)</td>
<td>(7.561)</td>
</tr>
<tr>
<td>AR(1)</td>
<td>.443***</td>
<td>.328**</td>
</tr>
<tr>
<td></td>
<td>(.165)</td>
<td>(.139)</td>
</tr>
<tr>
<td>N</td>
<td>37</td>
<td>60</td>
</tr>
<tr>
<td>$\chi^2$ statistic</td>
<td>19.19</td>
<td>57.522</td>
</tr>
</tbody>
</table>

Standard errors are in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Table 4.8 **Base 2004 Democratic Fundraising ARIMA**

<table>
<thead>
<tr>
<th></th>
<th>Dean</th>
<th>Gephardt</th>
<th>Kerry</th>
<th>Lieberman</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of Victory</td>
<td>.700*</td>
<td>.643</td>
<td>.584</td>
<td>-.533</td>
</tr>
<tr>
<td></td>
<td>(.397)</td>
<td>(.571)</td>
<td>(.401)</td>
<td>(.752)</td>
</tr>
<tr>
<td>Days to Convention</td>
<td>-.006</td>
<td>.0001</td>
<td>-.006**</td>
<td>.008</td>
</tr>
<tr>
<td></td>
<td>(.004)</td>
<td>(.002)</td>
<td>(.003)</td>
<td>(.007)</td>
</tr>
<tr>
<td>Constant</td>
<td>10.471***</td>
<td>9.206***</td>
<td>11.700***</td>
<td>9.082***</td>
</tr>
<tr>
<td></td>
<td>(2.125)</td>
<td>(1.378)</td>
<td>(1.625)</td>
<td>(1.331)</td>
</tr>
<tr>
<td>AR(1)</td>
<td>.040</td>
<td>.174</td>
<td>.443***</td>
<td>.212</td>
</tr>
<tr>
<td></td>
<td>(.179)</td>
<td>(.136)</td>
<td>(.140)</td>
<td>(.188)</td>
</tr>
<tr>
<td>N</td>
<td>21</td>
<td>45</td>
<td>74</td>
<td>49</td>
</tr>
<tr>
<td>$\chi^2$ statistic</td>
<td>9.086</td>
<td>3.487</td>
<td>17.31</td>
<td>3.079</td>
</tr>
</tbody>
</table>

Standard errors are in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

In Gore’s probability of nomination leads to a 2.8% increase in his weekly fundraising from outside of his base. As Gore drew an average contribution of $182,933 per week from outside his base, this implies an additional fundraising of more than $5,000 per week for each 1% increase in probability of victory. The base and non-base results also suggest that fundraising from Gore’s base was more responsive to changes in the political climate (as proxied by the probability of a Republican House).

Bradley, meanwhile, has a significant and positive elasticity of fundraising with respect to probability of victory both for his base and non-base. The results suggest that Bradley’s base was more responsive to changes in his probability of victory than his non-base by a large magnitude, similar to other successful insurgent candidates.

### 4.2.4 Democratic Nomination in 2004

In the results for the 2004 Democratic nomination campaign in the previous chapter, we found that Dean’s contributions did respond to changes in his probability of nomination, while other candidates’ contributions did not. In the
Table 4.9  Non-Base 2004 Democratic Fundraising ARIMA

<table>
<thead>
<tr>
<th></th>
<th>Dean</th>
<th>Gephardt</th>
<th>Kerry</th>
<th>Lieberman</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of Victory</td>
<td>.537***</td>
<td>.519</td>
<td>.664**</td>
<td>-.090</td>
</tr>
<tr>
<td>N</td>
<td>(1.48)</td>
<td>(.552)</td>
<td>(.362)</td>
<td>(.783)</td>
</tr>
<tr>
<td>Days to Convention</td>
<td>-.008***</td>
<td>-.0008</td>
<td>-.007***</td>
<td>.004</td>
</tr>
<tr>
<td>N</td>
<td>(.002)</td>
<td>(.002)</td>
<td>(.002)</td>
<td>(.008)</td>
</tr>
<tr>
<td>Constant</td>
<td>12.525***</td>
<td>10.643***</td>
<td>12.268***</td>
<td>10.108***</td>
</tr>
<tr>
<td>N</td>
<td>(1.373)</td>
<td>(1.338)</td>
<td>(1.466)</td>
<td>(1.418)</td>
</tr>
<tr>
<td>AR(1)</td>
<td>-.207</td>
<td>.119</td>
<td>.421***</td>
<td>.167</td>
</tr>
<tr>
<td>N</td>
<td>(.210)</td>
<td>(.160)</td>
<td>(.128)</td>
<td>(.187)</td>
</tr>
<tr>
<td>( \chi^2 ) statistic</td>
<td>25.079</td>
<td>1.003</td>
<td>22.585</td>
<td>3.921</td>
</tr>
</tbody>
</table>

Standard errors are in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

base and non-base regressions, we find that Dean’s elasticity is higher for his base, but it is positive and significant for both base and non-base contributors. The response of Kerry’s fundraising flows to changes in his probability of victory is significant for his non-base donors, though only at a 10% significance level, similar to the results for Gore in the 2000 race. For his base, like in the original results, changes in his electoral conditions do not affect donations.

4.3 Conclusion

The results of this section underline the difference between candidates with and without responsive contributions. The main implication is that a candidate’s financial bases are, for the most part, more responsive to changes in electoral conditions than the non-base (Alexander and Buchanan in 1996; Bradley in 2000; Dean in 2004). This holds true both for successful insurgent candidates, whose contributions increase with increases in their probability of nomination, as well as for some front-runner candidates with contributions that are elastic with respect to changes in general political climate (Dole in 1996; Gore in 2000). We also find that for the Democratic front-runners, Al Gore in 2000 and John
Kerry in 2004, contributions from outside of their bases were responsive to changes in their probability of victory. Finally, there is little systematic pattern in the base and non-base result with regards to fundraising stability or days until the convention.

Due to the general overlapping in bases, especially for Democratic candidates, these tests may lose some of their power. Though it is not feasible to do so, the ability to test whether or not additional “base” contributions are from previous supporters or new supporters would potentially allow a fuller understanding of fundraising outreach. That Howard Dean’s base, as currently defined, contributed more to his campaign when his prospects rose does not tell us whether his additional support in New York or Chicago came from previous Dean supporters, disenchanted Kerry or Lieberman supporters, or contributors who had previously been undecided. However, the fact that surges in contributions to most insurgents did come from an extra-energized base, underscores the importance of the major contribution hubs in politics, especially on the Democratic side.
The effect of campaign spending on electoral outcomes is the central question in the campaign finance literature. From a public choice perspective, this is of course the most relevant question—if there is no effect of campaign spending on results, then there is little or no need to regulate money in politics. However, if campaign spending does have a significant effect on who is nominated or who is elected, then there is a need for regulation. As discussed earlier, if money plays a significant role, then candidates who would not have attracted popular support in a perfect information scenario may win elections thanks to campaign spending.

This chapter presents two attempts to answer the broad question of the role of money in nomination campaigns. The first makes use of daily prediction market data and the exogenous release of FEC fundraising information each quarter and attempts to measure the effect of fundraising announcements on the probability that a candidate is nominated. The second uses a fixed effects estimation routine to identify cleanly the productivity of campaign spending in increasing the probability of nomination, drawing on quarterly expenditure data from the FEC and IEM market price data.

Taken together, the results suggest that money may have only a small role
in the nomination process. For one, it does not appear that the market reacts systematically to FEC releases of data. In addition, the estimated parameters for the effect of spending on the probability of victory are very small—an additional million dollars in quarterly spending leads to an increase of less than a single percentage point of probability of victory. However, it is important to take note of the limitations of using prediction market data. The fact that the market does not respond to FEC releases does not mean that the fundraising information is not important to the probability of nomination, but rather that that information may already be incorporated into efficient prices or that the FEC releases were not surprises (they were, in a sense, non-events). In addition, if the prediction markets are extremely efficient, it may be possible that expectations of candidate expenditures are already included in closing prices. Finally, though money may not be important during the course of a nomination campaign, this does not mean that fundraising or expenditures did not play a role in the ex ante identification of the front-runner candidate. As with the results from the preceding chapters, it seems that this designation may be the most important moment in the nomination process and yet the least easily explored and the least democratic.

5.1 Fundraising News and Electoral Expectations

On Guy Fawkes Day, November 5, 2007, Republican Presidential Candidate and Congressman Ron Paul (R-TX) raised $4.3 million dollars, reportedly a 24-hour record for the Republican field. The long-shot Republican candidate, who nearly matched his entire fundraising from the third quarter of 2007 with the one day haul, had previously spent only $2.8 million during the entire election cycle. In the third quarter alone, front-running Republicans like Mayor Rudy Giuliani ($13 million), Senator Fred Thompson ($5.7 million) and Governor
Mitt Romney ($21 million) all far outspent Paul. Even McCain, who at the time was far behind in the polls and had a campaign on the verge of bankruptcy, outspent Paul more than two to one in the third quarter. Now, as Paul claimed in a debate shortly after Guy Fawkes Day, money was coming in so fast it was difficult to figure out how to spend it.

Campaign fundraising may not affect electoral conditions through actual operational spending, which is infrequently updated and does not necessarily reflect the state of current contributions. Instead, perceptions about the candidates and their fundraising may affect the expectations about the voting. The political science literature suggests voters are very concerned about viability (Abramson et al. 1992; Crespin et al. 2000; Abramowitz 1989). Though not confirmed in academic literature, voters (and traders on political prediction markets) may assume that fundraising (either the ability to fundraise or the reality of having cash reserves on hand) is key to securing the nomination and is a good signal or measure of viability. Fundraising reports in the year before the general election may be especially important, as viability is very difficult to observe so early in the campaign.

Political experts and campaign insiders certainly seem to believe that fundraising equals viability. Ed Rollins, a top Republican consultant and strategist, predicted in *US News and World Report* that Paul, following the Guy Fawkes Day fundraising effort, would become “more than a back-of-the-pack candidate.”¹ Rollins made that claim despite the fact that Paul’s views on most policies were far out of the Republican mainstream and that the Congressman from Texas was regularly belittled by his opponents in debates. Money, Rollins implied, would lend Paul legitimacy as a contender. Of course, this never panned out. But this anecdote sheds light on how important political experts

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and operatives believe large fundraising displays to be during campaigns. Political pundits made similar predictions about the prospects of Senator John Edwards (D-NC) following his large tally in first quarter fundraising in 2003. Though Edwards would eventually emerge as a top-tier candidate, it did not happen until his success in the Iowa Caucus a year later.

This section focuses on an empirical investigation of the effects of campaign contributions on electoral expectations. Specifically, we test the reaction of political prediction markets to the quarterly release of nomination campaign fundraising results. Though FEC data is publicly available, it is only released quarterly, fifteen days after the end of each quarter. These reports are eagerly anticipated, both by the media and by political horse-race aficionados. A USA Today headline proclaimed on September 30, 1999, “Campaign cash race to get all-important checkup today.”

More than a year before the general election and four months before the Iowa Caucus, major newspapers were already claiming that fundraising reports would help determine who would win the nominations and the White House. Though the reports are not always accurate, they are always dramatic (Ansolabehere et al. 2005). Campaigns are convinced about the importance of these results as well. In March 2008, Hillary Clinton’s campaign sent out an e-mail solicitation for funds, signed by former President Clinton, noting how important the March filing results would be and encouraging donors to make contributions before the close of the month.

We use the FEC news releases as an exogenous timing mechanism which allows us to test cleanly for the effect of fundraising on electoral expectations. Essentially, the empirical study in this chapter estimates whether or not the prediction markets reacted to the news about fundraising. Do market traders observe FEC fundraising results and, in line with Ed Rollins’ comments,

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1 Jim Drinkard, “Campaign cash race to get all-important checkup today,” USA Today, September 30, 1999.
believe they measure a candidate’s legitimacy? We begin by building an ARIMA time-series model for the IEM markets for each candidate. Then, we use intervention analysis to estimate the pulse impact of the news and the exponential rate of decay of its effect on market prices.\(^3\) This technique allows us to answer two main questions about the fundraising announcements. First, is there an immediate effect on prices? Secondly, how long does this “shock” remain in the market (more, how quickly or slowly does it decay)? One benefit of this estimation strategy is the ability to fine tune the dates of intervention. Though quarterly reports are due exactly ten days after the end of each quarter and the information is released five days after that, many campaigns release their numbers (or hint at them) to the media before the FEC makes their announcements. Locating the intervention variables on the days the fundraising data becomes public information (rather than when the FEC officially reports it) should help identify the true effects of the reports on the prediction markets.

5.2 Identifying the ARIMA Models

The first stage in this estimation process is identifying the time-series nature of the prediction market data. Dependent variable data from this section are drawn from four of the IEM nomination markets we have access to: the 2000 and 2004 Democratic nominations and the 1996 and 2000 Republican nominations.\(^4\) Rather than aggregate the IEM data to weekly, as we have done

---

\(^3\) Again, this analysis follows the framework in McDowall et al. (1980) and Wei (2006). Following the convention in the literature, interventions or shocks to a capital market are assumed to be instantaneous with a rate of decay, rather than gradual in their onset. Rates of decay close to one, in absolute value, would imply the shocks are permanent.

\(^4\) Once again, we cannot use data from the shorter-lived 1992 Democratic nomination market. Because of its late start (January 1992), it would not be econometrically sound to fit a model of the prices and an interrupted time series in such a short span.
previously, we will use the daily level data. Given the liquidity and efficiency of these markets, it is likely that if there is a change in the true probability of victory based on the FEC releases, prices will adjust to reflect that very quickly (Snowberg et al. 2005; Wolfers and Zitzewitz 2004).\footnote{Moreover, if the FEC releases provide false signals to traders, which move the market prices only for a short time, then we would expect those movements to happen at the daily level (or faster) rather than at the weekly level.}

We first calculate the autocorrelation functions (ACFs) and partial autocorrelation functions (PACFs) of the daily price series. It is clear from the slow decay of the ACFs and single spike approaching one in the PACFs that this series needs to be differenced. Moreover, Augmented Dickey-Fuller tests on each series all fail to reject the null hypothesis that the variable follows a unit-root process, further making the case for first differencing. This follows because the IEM prices are, in a sense, asset prices, and asset prices are typically modeled as a random walk process. The first-differenced series, however, appears to be white noise. Here we can reject the null hypothesis of the Augmented Dickey-Fuller tests for all of the candidates’ price series.

Our only independent variables in this section are the FEC quarterly and monthly release events. These are measured as pulse dummy variables equal to one on the day of the event and zero before and after the event. We have collected the event day of this information through a Lexis-Nexis search of national and local media outlets and the events are presented in Table 5.1.

5.3 Estimating the Interrupted Time Series

The results for the interrupted time series analysis are displayed below. For the most part, the information release events did not have a statistically significant effect on the prediction markets. In the 1996 Republican nomination race, only the third quarter report (for Gramm) and the January report (for Dole) were
Table 5.1  FEC Fundraising Report Release Dates

<table>
<thead>
<tr>
<th>Race</th>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Republicans in 1996</td>
<td>April 14, 1995</td>
<td>First Quarter Report</td>
</tr>
<tr>
<td></td>
<td>June 29, 1995</td>
<td>Second Quarter Report</td>
</tr>
<tr>
<td></td>
<td>September 30, 1995</td>
<td>Third Quarter Report</td>
</tr>
<tr>
<td></td>
<td>December 31, 1995</td>
<td>Fourth Quarter Report</td>
</tr>
<tr>
<td></td>
<td>February 20, 1996</td>
<td>January Report</td>
</tr>
<tr>
<td>Both Parties in 2000</td>
<td>September 30, 1999</td>
<td>Third Quarter Report</td>
</tr>
<tr>
<td></td>
<td>December 29, 1999</td>
<td>Fourth Quarter Report</td>
</tr>
<tr>
<td></td>
<td>February 17, 2000</td>
<td>January Report</td>
</tr>
<tr>
<td>Democrats in 2004</td>
<td>April 3, 2003</td>
<td>First Quarter Report</td>
</tr>
<tr>
<td></td>
<td>June 25, 2003</td>
<td>Second Quarter Report</td>
</tr>
<tr>
<td></td>
<td>September 24, 2003</td>
<td>Third Quarter Report</td>
</tr>
<tr>
<td></td>
<td>December 29, 2003</td>
<td>Fourth Quarter Report</td>
</tr>
<tr>
<td></td>
<td>February 20, 2003</td>
<td>January Report</td>
</tr>
</tbody>
</table>

significant. The Gramm result, however, is very curious. To begin with, the pulse and decay terms have different signs. The econometric implication of this is not clear. Moreover, news reports from this release suggest that while Gramm posted a respectable $2 million in contributions during the quarter, Dole’s $5.5 million solidified his role as a “double-leader,” ahead in both the polls and the money. For Dole, it is not clear that the information release itself is causing this near-permanent increase in his prediction market price. Rather, the January report was released on February 20, 1996. That was also the day that Dole lost the New Hampshire Primary to Buchanan. However, in the two weeks that followed, Dole won primaries in the Dakotas and then swept Super Tuesday, ensuring him the nomination. It may be that these events are in fact driving the result; the best fit intervention model simply split the difference between his fall after New Hampshire and subsequent rise after Super Tuesday.

The only statistically significant FEC report in the 2000 primary season, either on the Democratic or Republican side, was the January release in February 2000. Though neither contracts on the Democratic side responded

---

Table 5.2  1996 Republican Interrupted Time Series Results

Effect of Fundraising Releases on Probability of Victory

<table>
<thead>
<tr>
<th></th>
<th>Alexander</th>
<th>Buchanan</th>
<th>Dole</th>
<th>Forbes</th>
<th>Gramm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995Q1</td>
<td>Pulse</td>
<td>ns</td>
<td>.</td>
<td>ns</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>Decay</td>
<td>ns</td>
<td>.</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>1995Q2</td>
<td>Pulse</td>
<td>ns</td>
<td>.</td>
<td>ns</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>Decay</td>
<td>ns</td>
<td>.</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>1995Q3</td>
<td>Pulse</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>Decay</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>-0.97</td>
</tr>
<tr>
<td>1995Q4</td>
<td>Pulse</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>Decay</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>1996M1</td>
<td>Pulse</td>
<td>ns</td>
<td>ns</td>
<td>2.56</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Decay</td>
<td>ns</td>
<td>ns</td>
<td>0.94</td>
<td>ns</td>
</tr>
</tbody>
</table>

All reported coefficients are significant at the 10% level or better.
ns: not significant; . : not estimated
Not estimated if candidate was not on the IEM or already dropped out.

significantly to this event, both Bush’s and McCain’s probability of victory did.
For Bush, the event triggered an immediate eight point drop in his probability
of victory. It took 20 days for his price to recover to the pre-intervention level.
For McCain, like Gramm’s contract in 1996, the signs of the pulse and decay
factors are different (the pulse implies a negative shock but the decay factor is
positive) and interpretation is unclear.

In 2004, the only candidate whose probability of victory responded
significantly to an FEC report was Howard Dean in December of 2003. Dean’s
contract price fell by more than five points and remained below its previous
level for about 10 days. Though Dean would later fall again due to his failure
in the Iowa Caucus, it is unlikely that that event is distorting this result. In the
December release, Dean posted $16 million in contributions which increased
his campaign total to $40.9 million. As both of these marks led the field, it
Table 5.3  2000 Republican Interrupted Time Series Results
The Effect of Fundraising News Releases on Probability of Victory

<table>
<thead>
<tr>
<th></th>
<th>Bush</th>
<th>McCain</th>
<th>Dole</th>
<th>Forbes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999Q3 Pulse</td>
<td>ns</td>
<td></td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>1999Q3 Decay</td>
<td>ns</td>
<td></td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>1999Q4 Pulse</td>
<td>ns</td>
<td>ns</td>
<td>.</td>
<td>ns</td>
</tr>
<tr>
<td>1999Q4 Decay</td>
<td>ns</td>
<td>ns</td>
<td>.</td>
<td>ns</td>
</tr>
<tr>
<td>2000M1 Pulse</td>
<td>-8.05</td>
<td>-8.44</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>2000M1 Decay</td>
<td>-0.86</td>
<td>0.56</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>

All reported coefficients are significant at the 10% level or better.
ns: not significant; . : not estimated
Not estimated if candidate was not on the IEM or already dropped out.

Table 5.4  2000 Democratic Interrupted Time Series Results
The Effect of Fundraising News Releases on Probability of Victory

<table>
<thead>
<tr>
<th></th>
<th>Gore</th>
<th>Bradley</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999Q3 Pulse</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>1999Q3 Decay</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>1999Q4 Pulse</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>1999Q4 Decay</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>2000M1 Pulse</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>2000M1 Decay</td>
<td>ns</td>
<td></td>
</tr>
</tbody>
</table>

All reported coefficients are significant at the 10% level or better.
ns: not significant; . : not estimated
Not estimated if candidate was not on the IEM or already dropped out.
Table 5.5  2004 Democratic Interrupted Time Series Results

The Effect of Fundraising News Releases on Probability of Victory

<table>
<thead>
<tr>
<th></th>
<th>Kerry</th>
<th>Edwards</th>
<th>Dean</th>
<th>Clark</th>
<th>Gephardt</th>
<th>Lieberman</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003Q2 Pulse</td>
<td>ns</td>
<td>.</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>2003Q2 Decay</td>
<td>ns</td>
<td>.</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>2003Q3 Pulse</td>
<td>ns</td>
<td>.</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>2003Q3 Decay</td>
<td>ns</td>
<td>.</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>2003Q4 Pulse</td>
<td>ns</td>
<td>.</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>2003Q4 Decay</td>
<td>ns</td>
<td>.</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>2004M1 Pulse</td>
<td>ns</td>
<td>ns</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>2004M1 Decay</td>
<td>ns</td>
<td>ns</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>

All reported coefficients are significant at the 10% level or better.
ns: not significant; . : not estimated
Not estimated if candidate was not on the IEM or already dropped out.

seems unlikely that this release would have lowered his probability of victory.\(^7\)

5.4 Conclusion

The overwhelming pattern in the data is the broad insignificance of fundraising news releases on the probability of nomination for all candidates in the sample. Though a few FEC release dates were significant events with effects on the IEM nomination markets, for the most part the releases did not affect the markets. The cases in which they did, and the signs were not statistical nonsense, were rare and at odds with published news reports about the FEC results. More,

\(^7\) In addition, the rest of the field contract had two significant responses to FEC release events, though only one has matching signs (not reported). According to the results, the rest of the field contract fell by almost a full point after the second quarter release in 2003 and this change was nearly permanent in duration (the decay parameter is nearly one in absolute value). To announce this release, The Associated Press led with a headline of “Democratic leader yet to emerge in early presidential money chase.” Despite the uncertainty, the rest of the field contract, which is a proxy for market uncertainty, decreased. Moreover, Dean and Edwards, both still members of the rest of the field at that time, announced large quarterly fundraising totals and both were near the top of the fundraising lists with Kerry.
most effects had disappeared within a month: though the decay parameters were high, the pulse parameters were not especially large and with daily data the effects trailed off quickly.

These results could have a few very different meanings depending on our assumptions about the FEC releases and the IEM markets. For one, we may reject the notion that these releases were in fact news. None of the quarterly filing results were especially surprising—front runners and other well-financed candidates rarely had low fundraising quarters and long-shots rarely announced huge totals. Ansolabehere et al. (2005) suggest that newspaper reports about FEC releases may also be inaccurate (quantities are often exaggerated); perhaps traders understand this and discount the FEC reports in newspapers, dulling the impact of the events. Though unlikely, it may be possible that the IEM had already aggregated fundraising information, through campaigns spending it during the previous quarter or through expectations about the totals, and so the releases did not move the markets.

Finally, campaign fundraising results may be a good signal of a candidate’s underlying electability or campaigning ability and they may increase expectations, generally, about a candidate’s viability. However, marginal traders on the IEM may be able to observe other signals of viability or campaign ability and incorporate those other signals into prices before the releases. In all, these results cannot disprove the importance of money in the nomination process, though they do imply that the channel through which campaign contributions and expenditures matter is not expectations based on campaign fundraising totals.
5.5 Fixed Effects and Campaign Spending Productivity

Much of the work in the campaign finance literature aims to estimate the productivity of the marginal dollar of campaign spending in increasing vote share (or, as is more relevant here, probability of victory). The basic issue, of course, is that a straightforward regression of electoral results (or expectations) on campaign spending is biased by unobservable variables. Moreover, there are unclear causal implications; as we have shown in the preceding chapters, for many candidates contributions are a function of electoral conditions. Claims about the effects of campaign spending on electoral conditions must be made in light of this endogeneity. Stratmann (2005) notes three ways in which scholars have attempted to correct the omitted variable bias and endogeneity issues: instrumental variables, better control variables, and panel estimation. However, as noted earlier, many of these attempts have arrived at a curious finding. In races for the United States House of Representatives, the productivity of campaign spending by challengers tends to be large and significant, while the spending of incumbents is often small and insignificant (and sometimes negative) (Jacobson 1978; 1985; Green and Krasno 1988; Erikson and Palfrey 1998). The results for the United States Senate, however, suggest that incumbent spending is positive and significant, though still less productive than challenger spending (Abramowitz 1988; Grier 1989). In races for the presidency, Nagler and Leighley (1992) suggest that spending increases vote share for both incumbents and challengers. However, it is not clear from their research which effect is stronger. All of these studies of the House, Senate and presidential elections rely either on strong assumptions about full controls and no omitted variables or weak instruments to avoid the inherent

---

8 In a slightly different direction, Goldstein and Freedman (2000) use advertisement measures and find that both incumbents and challengers in Senate races benefit from this type of spending, though the relative magnitudes are not significantly different from one another.
simultaneity problems and unobservable bias at the heart of the campaign finance system. The literature has not converged on stable estimates of the productivity of spending in any of these cases.

Due to data limitations, analysis has not extended in depth to races for the Presidency or the primary nomination campaigns. There have not been enough cross-sectional observations of nomination or general contests to estimate such productivity measures. The anecdotal evidence is mixed. Some of the biggest spenders crash and burn; neither Steve Forbes nor Mitt Romney was able to “purchase” the nomination despite vast personal fortunes (and a willingness to spend it). However, candidates do devote a tremendous amount of time to raising money (a necessary first step to spending it) and employ many experts who try to help them spend it efficiently and effectively. Further, until 2004, the Democrat with most money raised at the start of the general election year had become the nominee in all previous races; top Republican money raisers have had similar success (Adkins and Dowdle 2002). Finally, many candidates cite money as the chief reason that their candidacies faltered, often decrying its importance in their withdrawal speeches (for example, Gephardt in 1988 and Quayle and Dole in 2000).9 Given the importance of the nomination races and the large amount of FEC regulation over the contests, an exploration of the role of money in presidential politics seems highly necessary.

Levitt (1994) presents a novel solution to the problem of omitted variable bias, unobservable variables, and weak instruments. Rather than attempt to find a proxy for candidate quality or an instrument for spending, he uses repeat match-ups in House elections and estimates a first-differenced model. If, as he proposes, candidate quality is fixed, then his estimations

9 Of course, these recollections are seriously biased observations—as our stylized model of probability of victory will indicate, if money is not determining results, then candidate quality, appeal, or policies must be.
of the effect of campaign spending on vote share will be unbiased, as the first-differencing eliminates fixed variables (like candidate quality) from the specifications. Even if candidate quality or district-effects are not fixed, if the variation is small then the estimates are much less biased than previous work in the literature. Though are reasons to be skeptical of these findings, the econometric logic is solid.\textsuperscript{10} If we assume that candidate quality and other unobservable variables are relatively stable, the first differenced estimation will be much less biased than a simple pooled ordinary least squares estimation. This method, or the similar technique of fixed effects estimation, holds promise for producing unbiased estimates of the productivity of campaign spending in the presidential nomination contests. In fixed effects, as in Levitt’s first-differences model, constant factors (even those that are unobserved) can be differenced out, and we estimate an unbiased measure of the effect of variables that do vary (such as spending) on the probability of victory.

This section proceeds as follows: First, we begin by developing a very stylized model of the probability of nomination and show how fixed effects panel estimation is able to address the omitted variable bias caused by unobservable factors. Then, after discussing the data necessary to properly use this method, we estimate the fixed effects model of the effect of campaign spending on the probability of nomination. We conclude this section with a discussion of the implications.

\textsuperscript{10}For one, the subsample of House races in which the candidates face off twice, while relatively common, is still not likely to be a random sample of all House elections. Specifically, it may be these races where both candidates, challenger and incumbent, are widely known that money would be expected to matter the least (Jacobson 2006; Lott Jr. 1991).
5.6 Model and Data

Consider that the probability for victory for candidate $i$ at time $t$ is a function of that candidate’s spending, all of his or her opponent’s spending and all the candidates’ qualities:

$$V_{i,t} = \beta_1 E_{i,t} + \beta_2 \hat{E}_{i,t} + \delta_1 Q_i + \delta_2 \hat{Q}_i + a_i + u_{i,t} \quad (5.6.1)$$

where $V$ is the probability of victory, measured at the end of a certain period. Let $E$ be all the spending by a candidate during that period. Let $\hat{E}$ be the spending by all of the candidate’s opponents. Let $Q$ and $\hat{Q}$ be the quality of the candidate and that of his or her opponents. The $a_i$ term may include policy preferences of the voters or other factors constant across candidates in one race, or it may include other candidate-specific (and fixed) qualities that are unobserved or not measurable. Because the quality measures are unobserved, estimates of this type of a model without the measure will be biased. However, we are able to utilize the panel nature of our data. We have measures of each candidate’s expenditures each quarter of the primary season as well as prediction market prices to measure the probability of victory. If we assume that candidate quality is fixed, then we can estimate the following model fixed effects model without bias:11

$$\dot{V}_{i,t} = \beta_1 \dot{E}_{i,t} + \beta_2 \dot{\hat{E}}_{i,t} + \dot{u}_{i,t} \quad (5.6.2)$$

11Candidate quality is just one example of potentially unobservable variables whose omission could serious bias the results. Other possibilities include campaign ability or political ideology (with respect to the median or mean primary voter). In addition, though conditions may not vary across candidates within a race, conditions that are fixed and vary across races are also differenced out via fixed effects estimation.
where these are the time-demeaned variables and the constant measures, like candidate quality and the time-consistent error, are all differenced out. We will estimate this equation using quarterly data in a panel of all races in our sample.

We expect (and later find) that spending on operations by candidates should increase their probability of victory, while spending on fundraising is not likely to have any effect. Our results suggest, however, that the magnitude is very small. Further, spending by an opponent on operations should decrease a candidate’s probability of nomination, while opponent spending on fundraising will not have any effect. Unfortunately, this method does not allow a test of how campaign operation expenditures work. It is possible that spending increases vote share by convincing voters about a candidate’s high valence (or an opponent’s low valence), underlining policy positions, or reducing voter uncertainty about candidate quality or policies. Alternatively, spending may matter only as a signal of credibility. In this sense, spending is simply highly visible money burning (Prat 2002). Finally, it may be the case that spending helps candidates by increasing name recognition and knowledge (Jacobson 1978; Lott Jr. 1991). Still this section presents a general result that campaign spending is able to increase a candidate’s probability of nomination, but only in very small magnitudes.

To take advantage of the fixed effects estimator discussed above, we organize our data in a panel. From the FEC quarterly and monthly reports, we draw information on expenditures by campaigns. Because only the year of the general election is reported monthly, we aggregate the data to quarterly observations rather than interpolate the quarterly data in the year before to monthly observations. To get an idea of the dynamics of campaign expenditures, Figures 5.1, 5.2, and 5.3 present the average expenditure flows for candidates, bracketed by ±1 standard deviation bars for operating expenses,
fundraising expenses, and total expenses.

Clearly, spending increases during the course of the campaign and then falls off in the final quarter (the second of the general election year). This final result is caused by the fact that this quarter stretches from April to June and most nominations races are decided by this point. Many campaigns are over during the first quarter of the general election year. To prevent this from biasing our results, we focus only on the four quarters of the year preceding the general election. Because of this choice of quarters, we are able to include data from the 2008 Republican and Democratic campaigns for the first time in this thesis. These two additional races provide a number of extra candidate observations (see Table 5.6).\textsuperscript{12} Now, our panel extends across five nomination contents: the 1996, 2000, and 2008 Republican races and the 2000, 2004, and 2008 Democratic races (a total of 24 candidates and four quarters).

As noted in the data section, expenditures are divided into four sections in the FEC’s accounting framework: operation expenditures, fundraising

\textsuperscript{12}Despite his role as the inspiration for this thesis, we are unable to include data for Mike Huckabee in the fixed effects estimation because his contract is not spun-off on the IEM until the fourth quarter of 2007.
Figure 5.2

Figure 5.3

Table 5.6 2008 Nomination Contracts on the IEM

<table>
<thead>
<tr>
<th>Nomination Campaign</th>
<th>Candidate</th>
<th>Quarters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Democrats</td>
<td>Senator Hillary Clinton</td>
<td>1–4</td>
</tr>
<tr>
<td></td>
<td>Senator John Edwards</td>
<td>1–4</td>
</tr>
<tr>
<td></td>
<td>Senator Barack Obama</td>
<td>1–4</td>
</tr>
<tr>
<td>Republicans</td>
<td>Mayor Rudy Giuliani</td>
<td>1–4</td>
</tr>
<tr>
<td></td>
<td>Governor Mike Huckabee</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Senator John McCain</td>
<td>1–4</td>
</tr>
<tr>
<td></td>
<td>Governor Mitt Romney</td>
<td>1–4</td>
</tr>
<tr>
<td></td>
<td>Senator Fred Thompson</td>
<td>3–4</td>
</tr>
</tbody>
</table>
Figure 5.4

discharges, legal and accounting expenditures, and other. Most campaigns spend the majority of their funds on operating expenditures (on average, operations are nearly 75% of expenses for candidates listed on the IEM). Figure 5.4 presents the budgeting decisions of campaigns.

Most campaigns locate along the constraint line. This implies that they spend all of their money on either fundraising or operating expenditures. Though there are outliers, most campaigns spend between 60% and 100% of their funds on operations.\textsuperscript{13} There are more Republicans outside of that range, but there is not an obvious difference between the budgeting decisions of front-running campaigns and others.

\textsuperscript{13} Campaigns that reported spending none of their funds on fundraising activities were excluded from this scatter plot, though there was a fair number, especially in 2008.
5.7 Estimation Results

We run the fixed effects panel estimation for both operating expenses and total expenses to account for the imprecise manner of the FEC accounting rules. Both estimations include measures of spending by the candidate and by all of the candidate’s opponents in the period, measured in millions of real 2000 dollars. Following Levitt (1994), we use robust White Standard Errors to account for possible unexplained heterogeneity in the errors.14

The results for the estimations of the productivity of total spending and operation spending are very similar.15 Of course, this is not surprising, as operating expenses make up the majority of all candidates’ total expenditures and, as Graphs 5.1 and 5.3 present, they are dynamically very similar as well. However, it does imply that these results are not a product of FEC accounting standards. For the first regression, both estimated parameters are significant at the 5% level. The measured productivity of campaign spending is approximately 0.67. That implies that an additional $1 million of spending should lead to an increase in the probability of victory of less

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14 One potential problem could be correlation in the idiosyncratic error terms. In Levitt (1994) (and most other work in the campaign finance literature), the observations are “independent” elections, in the sense that each contest is only one data point. In our panel, however, the observation of one candidate’s probability of victory is drawn from the same market as another candidate’s probability. If the markets are efficient, which we believe they are, then at the very least the sum of the probability of victory measures should total one. Moreover, if there is a shock affecting the probability of victory of one candidate in a quarter, it is likely that the shock will affect another candidate’s probability of victory in that quarter. This violates a fixed effects estimation assumption that the idiosyncratic errors are uncorrelated. However, while this assumption is necessary for the estimator to be the best linear unbiased estimator, it will still be unbiased (Wooldridge 2006). To account for this potential correlation of idiosyncratic error terms, we include quarter-race dummy variables as control variables. With five races and four quarters, this means including an additional twelve variables into our model. The estimation results indicate that these control dummy variables are all jointly and individually insignificant.

15 For robustness, we ran additional estimations with non-linear relationships between the variables (log, squares, and square roots) and in all cases the implied effects of money on probability of victory were small in magnitude and statistically significant at the 5% level or better. Effects of opponent spending were similarly small, negative and significant at the 10% level or better.
Table 5.7  Fixed Effects Estimation of the Productivity of Campaign Spending on Probability of Victory

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations Spending</td>
<td>.671** (.306)</td>
<td></td>
</tr>
<tr>
<td>Opponents Operation Spending</td>
<td>-.247** (.104)</td>
<td></td>
</tr>
<tr>
<td>Total Spending</td>
<td></td>
<td>.750** (.352)</td>
</tr>
<tr>
<td>Opponents Total Spending</td>
<td></td>
<td>-.273** (.116)</td>
</tr>
<tr>
<td>Observations</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>R-Squared</td>
<td>.129</td>
<td>.138</td>
</tr>
<tr>
<td>F-Statistic</td>
<td>3.372</td>
<td>3.03</td>
</tr>
<tr>
<td>$\rho$ (fraction of variation due to fixed effects)</td>
<td>.86</td>
<td>.856</td>
</tr>
</tbody>
</table>

Standard errors are in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

All expenditures are measured in millions of real 2000 dollars.

than one percentage point (in fact, less than three-quarters of a percentage point). The average candidate spends approximately $7.1 million each quarter (in the quarters of the year before the general election); doubling that expenditure would increase a candidate’s probability of nomination by less than 5 percentage points. While this may be enough to help a candidate emerge from a crowded pack, it is certainly not enough of a boost from spending to help a candidate catch a front-runner. Moreover, it is extremely unlikely that a candidate could afford to make such an unrealistically high increase in spending.

The estimated parameter for opponent operating expenditures is approximately $-0.25$. This implies that if a candidate has 4 opponents and each is able to increase spending by $1 million then the first candidate’s probability of victory is expected to fall by about one percentage point. This coefficient is significant at the 5% level. The coefficient on opponent (total) spending in the second model, also significant at the 5% level, has a similar sign and
Finally, both models suggest that fixed effect factors are responsible for about 85% of the variance in the probability of victory measure. This is also strong evidence that while money may have a role in determining the nominees, there are fixed factors (like candidate quality or political positions) that are likely even more important. One drawback of the fixed effects method is that we are unable to measure the effect of each of those fixed qualities and to attempt to identify which of the many possibilities are truly responsible for determining nomination probabilities. However, as many of these qualities are likely unobservable or have only poor proxies in data, the fixed effects method at least allows us to make an unbiased estimation of the effect of spending. The high fixed effects value underlines the extreme bias of a simple regression of probability of victory on expenditures.

While the panel estimation allows us to produce unbiased parameters for the relationship between campaign spending and probability of victory, it is not clear that this is a causal relationship. As we saw in the previous chapters, campaign fundraising totals often react to changes in the probability of victory. Presidential primary campaigns have little incentive to run a long-run surplus (or turn a profit by spending less than then take in) because most of this money cannot be used in the general election. Therefore, if increases in the probability of victory lead to more money being raised, then we would expect this money to be spent. In addition, if we assume campaigns are not pressing against their budget constraint in every period, then it may be possible that campaigns spend in reaction to their probability of victory: as electoral conditions changes.

\footnote{For robustness, we also estimate the effect of fundraising expenditures on electoral expectations. As expected, we do not find a significant relationship between that type of spending and the probability of victory. Further, a model of probability of victory which includes candidate and opponent spending on operations and fundraising produces similar results: operation spending is significant and positive, though small, and fundraising spending is insignificant.}
campaigns may reassess their budgeting decisions.

However, these two theories of reverse causality seem unlikely. One may reasonably argue that candidates adjust spending allocation in response to their electoral prospects. However, to explain the signs in our estimations, candidates would have to be increasing spending on operations when they are more likely to win and decreasing it when they are less likely to win. This would suggest that candidates, when slipping in the polls (or on the prediction markets), shift money to fundraising and away from operations, as they know their fundraising will take a hit from their reduced viability. This seems unlikely. Moreover, the small magnitude of the estimated parameter, when interpreted under the reverse causality, implies that a very small change in the probability of victory leads to a very large increase in operational spending. While campaigns may not be pressed against their budgets, it is unlikely that there is that much scope for additional spending; though campaigns do run short-term deficits, they are strictly budget-constrained in the long-run.\footnote{Candidates do not spend every dollar they take in each quarter, as they often end quarters with cash on hand. Even in the short-run, however, campaigns cannot and do not run very large deficits. In our sample, only Al Sharpton in 2004 ended a quarter with negative cash on hand (more spent than collected in aggregate). For candidates with contracts listed on the IEM, the minimum cash on hand to end a quarter was about $4000 (in real 2000-dollars).}

In addition, the time dimension of these estimations has causal implications. We measure probability of victory as the market price at the very end of the quarter. The expenditure data, meanwhile, is the total expenditure during the course of that quarter. That is, the odds of victory for Gore on December 31, 1999 are matched with his spending from October 1 to December 31. If probability of victory is causing spending decisions, it is likely happening through the fundraising mechanism. For this to happen, we would have to believe that expectations about electoral conditions lead to increased fundraising, which then leads to increases in spending—all in the
course of a single quarter. While not impossible, this channel seems less likely, especially as we know that only a subset of candidates’ fundraising flows are significantly affected by their probability of victory. Of course, the ideal test of these results would use higher frequency data, in which case the timing exclusion mechanism would be stronger. However, given the data we have to work with, these estimations still provide a strong indication that campaign spending does not have a very large effect on the probability of victory during presidential nomination races.

5.8 Conclusions

It is difficult to compare the results from this section directly to the existing campaign finance literature because of the difference in dependent variables. Rather than use vote share, or even expected vote share, we rely on the prediction market prices, which imply probability of victory. Certainly, an increase of one percentage point of this measure is not equivalent to a similar increase in (expected) vote share. Moreover, it is not clear what transformation would be necessary to equate them.\(^{18}\) Nominations are not based on the results of a single vote, but rather the results of many state primaries and caucuses; in this sense, money is spent throughout the course of a nomination campaign to secure the nomination—in the long-run, it is more accurate to consider that a candidate tries to maximize the probability of nomination rather than maximize votes or primaries won (the votes are means, not an end).

Tables 5.8 and 5.9, from Gerber (2004), present the expected increase in vote share of $100,000 in spending, as well as the implied cost of each additional vote. Compared with the results from Green and Krasno (1988) and Erikson

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\(^{18}\)Erikson and Wlezien (2008) suggest a technique to translate poll results into probability of victory measures, but these transformations appear highly sensitive to assumptions about the underlying probability distributions.
Table 5.8  Effect of $100,000 Spending Increase on Candidate Vote Share (House Elections)

<table>
<thead>
<tr>
<th></th>
<th>Incumbent</th>
<th>Challenger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jacobson (1978; 1985)</td>
<td>+0.14</td>
<td>+2.17</td>
</tr>
<tr>
<td>Green and Krasno (1988)</td>
<td>+1.8</td>
<td>+1.96</td>
</tr>
<tr>
<td>Levitt (1994)</td>
<td>+0.07</td>
<td>+0.24</td>
</tr>
<tr>
<td>Erikson and Palfrey (2000)</td>
<td>+0.57</td>
<td>+1.07</td>
</tr>
</tbody>
</table>

Reproduced from Gerber (2004), these effects are measured in 1998 dollars.

Table 5.9  Approximate Cost of Adding One Vote to Candidate Vote Margin

<table>
<thead>
<tr>
<th></th>
<th>Incumbent</th>
<th>Challenger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jacobson (1985)</td>
<td>$188/vote</td>
<td>$12/vote</td>
</tr>
<tr>
<td>Green and Krasno (1988)</td>
<td>$15/vote</td>
<td>$13/vote</td>
</tr>
<tr>
<td>Levitt (1994)</td>
<td>$367/vote</td>
<td>$110/vote</td>
</tr>
<tr>
<td>Erikson and Palfrey (2000)</td>
<td>$46/vote</td>
<td>$24/vote</td>
</tr>
</tbody>
</table>

Reproduced from Gerber (2004), these costs are measured in 1998 dollars.

and Palfrey (2000), votes are much more expensive in presidential nomination contests. The results here are in line with the findings in Levitt (1994) that money has little effect. Work in the campaign finance literature suggests that the main purpose of campaign spending is to increase name recognition (Jacobson 1978; 2006; Lott Jr. 1991). For elections to the House and Senate, incumbents may have small rates of return on spending because they already have high recognition. In the context of a nomination campaign, it may be that all candidates seeking the nomination (or, the subset seeking the nomination that is “serious” enough to have its contracts traded on the IEM) are so recognizable that increased spending has little effect.

Another possible use of money is as a sign of viability or legitimacy—campaign spending is really nothing more than money burning to signal a candidate’s credibility (Prat 2002). In this case, the results suggest that it is a very weak signal. A candidate would have to spend much more than would be expected to change his or her probability of nomination through spending. Similar to the name recognition argument, there may be little scope
for increased credibility on the part of candidates viable enough to run for president (and be listed on the IEM).

The small magnitudes of the estimations in this chapter imply that expenditures during a nomination campaign have little effect on the electoral outcomes. However, this is only an implication; the results literally mean that expenditures do not affect prices on the IEM nomination markets. One potential reading of the results is that the markets are efficient to the point that they can predict expenditures. So, prices are set based on those expectations and therefore prices do not move when the actual expenditures are made. More generally, these results once again imply that the *ex ante* determination of which candidates are front-runners and which are long-shots explains much more of the probability of nomination than even the millions of dollars spent by candidates during the course of the campaign. From 1992 to 2004, the candidate with the highest contract price on the IEM following the first day of trading was the eventual nominee in all markets in our sample. Though the prices do move through the course of the campaign, the major price setting, it appears, happens very early in the process. While the money candidates spend during the nomination campaign may not be important, that does not mean that fundraising or expenditures (or expectations about a candidate to do both efficiently) did not play a role in that *ex ante* identification of the front-runner candidate. As with the results from the preceding chapters, it seems that this designation may be the most important moment in the nomination process and yet the least easily explored.
CHAPTER 6

Putting the Model Together with VAR

This thesis was motivated in part by a discussion of the candidacy of Governor Huckabee for the 2008 Republican nomination. Huckabee, despite espousing popular Republican policies and having what appeared to experts as high valence, was not seen as a serious contender for the nomination. In addition, he could not raise enough money through campaign contributions. The question, of course, is which came first? To this point, this thesis has examined each direction of this question individually. We have shown that some candidates are able to increase contributions through increases in their probability of victory (their viability or “seriousness”), while others have inelastic funds. What’s more, this separation happens between front-runners and long-shots. We have also seen that it does not appear that the political prediction markets are moved in an economically significant way by campaign spending (or by fundraising information releases). In this chapter, we put the models together and estimate a vector autoregressive system (VAR) of the effect of campaign fundraising on political conditions and the effect of political conditions on campaign fundraising. As Stock and Watson (2001) note, VAR models are “powerful and reliable tools” for data description and are used here to gather a preliminary understanding of the potential feedback mechanism between
The results, for the most part, echo previous work in this thesis. For many insurgent candidates who were previously found to have elastic funds, the VAR results show that shocks to their probability of victory lead to short-run spikes in their contributions, most of which fade to zero within a month. For front-running candidates, the shocks in probability of victory are generally statistically insignificant (though negative for some candidates), and the same is true for long-shot candidates who never develop into credible challengers. There is also evidence that most successful insurgents have a feedback mechanism of some type in their fundraising and electoral conditions, where shocks to one tend to relay shocks to the other. For front-runners, however, neither variable appears to influence the other.

This chapter proceeds as follows. We begin with a brief discussion of VAR models and their relevance to this type of work as well as a defense of the recursive VAR model used here. We then describe the orthogonalized impulse response functions estimated with the recursive VAR parameters and their implications on the role of money in politics. In addition, we examine Granger Causality tests for each candidate. Finally, the section concludes with a discussion of all the results and a more general comparison with the findings in the previous chapters.

6.1 VAR Models

Sims (1980) introduced VAR models first in a macroeconomic context. The technique is an extension of univariate autoregressions to a multidimensional framework. Variables are explained as a function of their lagged values and the present and lagged values of other variables. Each other variable is in turn explained by its own lags and the present and lagged values of all the other
variables. While VAR models are applicable for arbitrarily large $n$-variable models, we restrict here to $n = 2$: probability of victory and total contributions. Each is explained by its own lagged values and the lagged values of the other.

We make use of a recursive VAR model in this chapter rather than a reduced form model or a structural VAR. The recursive model includes some but not all contemporaneous variables as regressors in addition to the lagged values. In our case, we again make use of the exclusion restriction argued for in Chapter 3. While the delay between updated electoral conditions and contributing may be short (a week or two at most), it is more likely that the translation of incoming funds into campaign expenditures (which may then change electoral conditions) will be a longer process. Thus, in the short-run, the probability of victory should have an effect on campaign contributions, but contributions should not have an effect on the probability of victory. As such, we use Cholesky ordering in our VAR such that the contemporaneous values of probability of victory are allowed to have an effect on fundraising, but not the other way around. Clearly, these results are sensitive to the ordering selection, which is why the method requires a theoretical justification of the selected recursion.

In the reduced-form estimation of a VAR model, if there is correlation in the variables then there will be correlation in the errors across equations (Stock and Watson 2001). However, the recursive model is free of such error correlations by including the contemporaneous values as discussed above. The structural VAR is not used because of the more stringent theoretical requirements it imposes on our models. At least one model would have to be specified with assumed coefficients and structure, an assumption that is simply not possible in this case.

The first step in estimating the VAR models is to determine the lag structure.
We find the optimal lags by attempting to minimize Schwarz’s Bayesian information criterion (SBIC) for each candidate.\textsuperscript{1} For the all candidates, lags of between 1 and 4 weeks are optimal; rather than standardize the lag structure across candidates, we instead use the individually optimal lags for each candidate.

### 6.2 Orthogonalized Impulse Response Functions

A standard tool in interpreting VAR results is an impulse response function. These graph the responses of current and future values of our variables to one unit shocks to the error of the VAR equations. The errors are assumed to return to zero in future periods, and the error terms of the other equations are expected to be zero in all periods as well. This simulates a once-off exogenous shock to one variable and way the shock propagates through the system. As Stock and Watson (2001) note, this experiment is best applied to recursive (or structural) VAR models because of the assumptions about uncorrelated errors. Figure 6.1 plots the orthogonalized impulse response functions (OIRFs), where the functions graphed are assumed to follow the estimated VAR parameters according the ordering criteria used (that is, the exclusion restriction applies).

The general theme, it appears, is that many candidates show some kind of a spike in contributions following shocks to their probability of victory. This response is usually largest and significant for the insurgent candidates with elastic funds (for example Alexander, Buchanan and Bradley). For the front-runners, the reaction of their funds is less clear; Dole’s is estimated to be negative, Bush’s very positive, and Gore’s falls and then rises. However, all are statistically insignificant reactions, with the 95% confidence intervals always

\textsuperscript{1} Other standards to use include Akaike’s information criterion (AIC); SBIC is chosen because it provides consistent estimates of the true lag order, unlike AIC (Lütkepohl 2005).
Alexander OIRFs

Probability of Victory Shock to Contributions

Weeks

Contributions Shock to Probability of Victory

Weeks

Probability of Victory Shock to Probability of Victory

Weeks

Contributions Shock to Contributions

Weeks

Buchanan OIRFs

Probability of Victory Shock to Contributions

Weeks

Contributions Shock to Probability of Victory

Weeks

Probability of Victory Shock to Probability of Victory

Weeks

Contributions Shock to Contributions

Weeks

132
Figure 6.1
including zero (no response). For long-shot candidates who fail to derive additional funds from increases in their electoral probabilities (such as Gramm in 1996 or Lieberman in 2004), we see immediate spikes in their contributions followed by steep drop-offs, usually within a week of the shock.

For the effect of a shock to total contributions on the probability of victory, we see that the impulse responses are generally all insignificant. While some show evidence of a small spike (usually not more than one or two probability points), these results are all statistically indiscernible from zero.

The final OIRFs to examine are the effects of shocks to either the probability of victory or total contributions on their own future values. Most candidates show monotonic falls, either quickly or slowly following shocks to their probability of victory. The only outlier is John Kerry. Interestingly, shocks to his probability of victory seem to persist and then grow by week three or four before fading back to zero by week twelve. Shocks to total contributions, meanwhile, are all very similar: the effect falls and is usually insignificant within a few weeks.

### 6.3 Granger Causality Tests

Granger Causality statistics test whether or not past values of one variable help to predict values of another variable. The tests are not to be applied lightly—without a proper theoretical lens through which to examine the results, they can easily promote spurious correlation to spurious causation. The results are presented in Table 6.1 as F-tests and $\chi^2$ statistics; the null hypothesis of the tests is that the first variable does not Granger-cause the second variable. The most immediate results of the Granger Causality tests is that for front-runners (with the exception of Kerry in 2004, who may or may not be properly classified as a front-runner), we cannot reject either null hypothesis. That is, their
Table 6.1  Granger Causality Tests

<table>
<thead>
<tr>
<th>Candidate</th>
<th>( H_0: ) Fundraising does not Granger-cause Probability of Victory</th>
<th>( H_0: ) Probability of Victory does not Granger-cause Fundraising</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( F)-test</td>
<td>( \chi^2 ) Statistic</td>
</tr>
<tr>
<td>Alexander</td>
<td>1.21</td>
<td>2.80</td>
</tr>
<tr>
<td>Buchanan</td>
<td>4.43**</td>
<td>10.37*</td>
</tr>
<tr>
<td>Dole</td>
<td>1.62</td>
<td>1.73</td>
</tr>
<tr>
<td>Gramm</td>
<td>0.67</td>
<td>0.74</td>
</tr>
<tr>
<td>Bush</td>
<td>1.31</td>
<td>1.44</td>
</tr>
<tr>
<td>E. Dole</td>
<td>1.08</td>
<td>1.54</td>
</tr>
<tr>
<td>Forbes</td>
<td>0.26</td>
<td>0.67</td>
</tr>
<tr>
<td>McCain</td>
<td>13.19*</td>
<td>342.87***</td>
</tr>
<tr>
<td>Bradley</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Gore</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Dean</td>
<td>1.38</td>
<td>12.40**</td>
</tr>
<tr>
<td>Kerry</td>
<td>0.20</td>
<td>0.43</td>
</tr>
<tr>
<td>Lieberman</td>
<td>0.12</td>
<td>0.13</td>
</tr>
<tr>
<td>Gephardt</td>
<td>0.30</td>
<td>0.33</td>
</tr>
</tbody>
</table>

* significant at 10%; ** significant at 5%; *** significant at 1%

Funds are neither Granger-caused by their probability of victories, nor are their probability of victories Granger-caused by their fundraising. However, having neither Granger-causality is not a sufficient condition to be a front-runner; both Lieberman and Gephardt in 2004 have neither Granger-causalities.

Buchanan and McCain, two of the more successful insurgents, have a feedback mechanism at work; both of their fundraising results are Granger-caused by their probability of victory, which itself is Granger-caused by their fundraising results. This feedback has the power to reinforce positive shocks and, perhaps, helps to explain why Buchanan was able to challenge Dole while other candidates were not (Buchanan won several primaries, including New Hampshire in 1996). However, the feedback mechanism can work in the opposite direction as well. A negative shock to either candidate’s probability
of victory or to his fundraising had the potential to disrupt the other, leading to larger reductions in both measures in the weeks that followed.

In general, more candidates show evidence of probability of victory Granger-causing contributions than the reverse. This result, however, may in fact have more to do with the imprecision of fundraising tallies in proxying for expenditures. For the most part, the expectation is that fundraising should increase probability of victory only in so much as it is used as campaign expenditures (or it is used as a credible signal that contributors believe a candidate is a serious candidate). However, many candidates may translate money raised into money spent at different frequencies and with different budgeting decisions. Still, that the majority of the Granger Causality tests implies that probability of victory Granger-causes fundraising results, but not the other way around, may be a significant fact. The motivating indeterminacy surrounding Huckabee may be reduced to the fact that his lack of viability (determined exogenously) caused his lack of fundraising, but not the reverse.
Conclusion

The Huckabee Paradox Resolved?

On March 4, 2008, Governor Mike Huckabee was mathematically eliminated from the Republican nomination when John McCain clinched his 1,191st delegate. That night, speaking from Kansas City, MO, he officially withdrew from the race. When thanking his staff, Huckabee noted that he had made it as far as he did with a team of only 30 people. “Imagine trying to do this with about 30 people,” he asked the crowd rhetorically. “I don’t think it’s ever been attempted. No one has ever gotten this far with such limited resources.”

In many ways, Huckabee’s experience during the 2008 nomination follows the results of this thesis. His electoral success in the Iowa Caucus led to an increase in donations to his campaign, which had previously been run on a shoestring budget. However, the increase in funds, translated into an increase in campaign expenditures, did not have a huge effect on his probability of victory or electoral results. Huckabee was able to use his early success and subsequent fundraising to make his campaign more “serious,” enabling him to win a number of southern states during Super Tuesday. In doing so, he emerged as McCain’s only foil. However, despite rhetoric about waiting for a miracle and increasingly passionate support from his own base, much of the

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Republican Party moved toward McCain. After his Super Tuesday success, Huckabee won only two more states before throwing in the towel. Certainly, electoral conditions and candidate qualities mattered to Huckabee’s rise—Romney’s millions, for example, could not net him a win in Iowa—but money mattered as well. If Huckabee had enjoyed the same resources as McCain, Giuliani, or Romney early in the race, he may have emerged as the winner.

The contest underlined the inevitability of the ex ante determinations. In November 2004, four years before the 2008 general election and two years before candidates would beginning announcing their intention to compete for the nomination, the InTrade markets listed McCain as the Republican favorite with a contract trading at $32. Though his contract rose and fell during the period, McCain ultimately rebounded to win the nomination, just as the market had expected in late 2004. The nomination campaign may have served its role as the sorting mechanism to select the public’s utility maximizing choice; that question is not debated here. Regardless, it is the case that the political prediction markets managed to identify the eventual choice two years before the campaigns even began.

Of course, across the political aisle, the Democratic race in 2008 may ultimately break the trend of the inevitability of the ex ante determinations. Though Hillary Clinton began well ahead on the prediction markets (both on InTrade and the IEM), Barack Obama put together a number of primary and caucus wins and, as of early April 2008, was the prohibitive favorite on the markets. This drives the question further: what was different about the 2008 Democratic race that broke the usual model? Did campaign spending have a stronger effect on election results? Did Obama’s contributions respond to his success with more contributions than other insurgents had received in the past? Did Obama manage to usurp Clinton’s role as front-runner through electoral
success in Iowa or after Super Tuesday, or was it his high levels of fundraising throughout 2007 and in early 2008 that led to his dominant position?

**Thesis Results**

This thesis investigated the role of contributions and expenditures in the presidential nomination process and the effects of electoral conditions on fundraising. We found that the fundraising flows of front-runner candidates tended not to respond to changes in electoral expectations. The fundraising of candidates who emerged as serious challengers to front-runners, such as Buchanan in 1996 or Bradley and McCain in 2000, did respond significantly to movement in the candidates’ electoral conditions, though ultimately none won the nominations. We also found evidence that these candidates received stronger surges of support from their financial and political bases than from contributors outside these regions. In addition, base supporters of some front-running candidates (Gore in 2000 and Dole in 1996) responded to more general political climate controls. These front-runner supporters may have cared more about general election conditions than nomination chances, as they felt assured that their candidate of choice would ultimately be nominated. Results from an event study using the announcements made by Colin Powell during 1995 suggest that front-runner funds do respond to electoral conditions, namely the condition that the front-runner may be dislodged from his or her place at the lead of the race.

The emphasis on the importance of the *ex ante* classifications of candidates as either front-runners or long-shots in determining the flow of fundraising relates back to fundraising flow work by Damore (1997). Similar to the findings in this thesis, Damore (1997) suggests that electoral success only encourages increases in donations for long-shots. In addition, using a measure
of pledged nomination delegates, he suggests that viability is important for the front-runners. In a similar vein, we find that front-runners’ contributions depend on general political climate measures and the fact that they are front-runners. Though it is impossible to fully disentangle the effects of the supply of campaign contributions (by citizens) and the demand for contributions (by candidates), our results do suggest a few important behavioral facts about the billion dollar mystery of political consumption by contributors. Contributors to different types of campaigns responded (or did not respond) to different signals about electoral conditions. The proper campaign fundraising model may be a hybrid of the organization-driven model (for front-runner campaigns) and the momentum model (for long-shot and insurgent campaigns).

We also concluded that campaign spending has a very small, though statistically significant, positive effect on the probability of victory, while fundraising information releases are not significant. In the campaign finance literature, this result is in line with the findings in Levitt (1994), though our results may in fact be stronger. For one, our estimated productivity parameters are consistently statistically significant and very small. It is also more likely that candidate effects (quality or policies, for example) are fixed during a race rather than from one race to the next, reducing (or eliminating) the bias in our model compared to Levitt’s.3 However, compared with other canonical results in the literature, our estimates of the effectiveness of campaign spending on election results are much lower. This may have to do with the efficiency and predictive power of the IEM and its forward-looking traders. However, we suspect that the main reason is our ability to control for the unobserved (and poorly controlled for) heterogeneity inherent in political campaign models. As

3 In addition, unlike Levitt (1994), our sample is not a (potentially unrepresentative) subsample of presidential nomination contestants, but rather it is the full sample of all candidates runner for the nomination from 1996 to 2008.
noted earlier, about 85% of the variation in probability of victory is attributable to candidate-specific fixed effects, many of which are not observed and thus bias up the estimated effects of spending in previous work in the literature.

*Prima facie*, our productivity of campaign spending estimates suggest that money is relatively unimportant during the nomination campaign. However, the importance of the *ex ante* classifications begs the question of how these classifications are decided and whether or not money plays a role. Given the dissonance between the ineffectiveness of spending during the nomination campaigns and the overwhelming obsession that candidates and the press have with fundraising, it may be the case that money does play an important role in determining front-runners and long-shots *before* the pre-nomination period even begins.

Much of the work on campaign finance is motivated with a fear about the role of special interest money and the inefficient public choices that it may cause. However, our results suggest that fear may be unnecessary. The candidates who are able to tap into a feedback mechanism between fundraising and probability of nomination were insurgent campaigns. Though they were able to challenge front-runners, none of these campaigns succeeded in winning the nomination. What was unique about these candidates was their ability to translate fundraising results into improved expectations about their electability. Somehow, these candidates could generate hype or signal seriousness with positive fundraising results and other long-shot candidates could not. Though it is not clear why certain candidates were able to tap into such a mechanism, it does seem likely that their ability to do was the reason for which they were able to emerge as serious challengers to the front-runners.
Further Work

Perhaps the strongest finding of this thesis is that the *ex ante* determination of candidates as either front-runners or long-shots a full year or more before the first primary is one of the major determinants of fundraising flows and, ultimately, election outcomes. However, given the emphasis placed on fundraising and expenditures in the nomination process, it is unlikely that the role of money is totally negligible. In fact, it may be that expectations about fundraising ability or realized fundraising in the years before the election cycle even begins are key determinants of these *ex ante* classifications. This finding highlights the need to examine the pre-pre-nomination process, including the role of political leadership committees and fundraising in generating presumptive front-runners well before the nomination. Further, it is not clear that the *ex ante* determinations are necessarily inefficient from a public choice perspective. Certainly, the importance of these classifications reduces the influence of the democratic stage of the nomination contests (voting in primaries and caucuses), but the “best” leaders (those with higher valence and socially efficient policies) may still be elected. Certainly, this is a question that needs to be addressed as well. What types of candidates are nominated by the pre-pre-nomination process, and are they the best from a public choice perspective?

This study was also limited to analysis of presidential nomination campaigns. While these campaigns are arguably the most important, it is not clear that the implications of this thesis are directly applicable to other nominations. Though not every Senate or House race candidate is vetted in a competitive party primary, a large number are. As noted earlier, nominations are important in the context of fundraising because candidates are potentially competing both for donations and votes. And, as Boss Tweed elucidated,
these nomination races may be the most important stage in determining our elected officials. At present, a similarly thorough study of both the fundraising dynamics of these nomination races or of the effectiveness of fundraising may not be possible; though InTrade offers a wide range of markets, it does not offer trading on House or Senate primaries. However, the large number of races increases the possibility of quality cross-sectional analysis, given clever use of variable controls or instruments.

InTrade does issue markets for Senate races. Combined with monthly expenditure and contribution data from the FEC (during the year of the general election), there is significant scope for a fixed effects estimation of the effectiveness of campaign spending on the probability of victory, as well as a study of the determinants of campaign budgeting, the effectiveness of fundraising spending on contributions, and fundraising elasticities with respect to electoral conditions. With ten to eleven months and thirty to forty candidates per election cycle, this panel set has the potential to provide a number of important insights into the role of expenditures, fundraising, and expectations on Senate races.

In measuring the effectiveness of expenditure, we chose probability of nomination as our dependent variable. For the campaigns we studied, this was the only market price widely available. However, for the 2008 nomination season, InTrade has also introduced markets for all specific primaries and caucuses. For the most part, trade volumes were high and the markets were very efficient and accurate: from the Iowa Caucus to the Mississippi and Wyoming primaries, InTrade closing prices from the night before the primary or caucus votes predicted the winner in all but a select few contests. Combining these individual markets with actual vote totals and FEC state-by-state spending reports would allow for the estimation of the productivity of
expenditures in increasing vote share while controlling for expectations. It may also be possible, using these state markets, to test whether local conditions are more important than national conditions in individual contribution decisions.

To assess the determinants of campaign contributions, we examined the differences between the contribution behavior of base and non-base contributors in an attempt to understand how contributor heterogeneity affects fundraising flows and electoral dynamics. In addition to improving or altering our chosen base definition, it would also be worthwhile to explore the other (observable) heterogeneity between contributors and examine how this heterogeneity affects behavior. Though the FEC data are limited to contributors over $250, it may be instructive to divide contributions into large and small donors (above or below $500 or $1,000 for example) to see if there are differences in their contribution flows. It would also be interesting to test for the differences in contributions by individuals living in states with early primaries (as they are saturated with campaign advertisements) or to attempt to track the effects of endorsements and other local campaign events on donations. If a candidate visits a town and gives a speech, will this increase contributions from that area? Further, our results suggested that some candidates’ funds were responsive to their probability of victory. It would be worthwhile to study whether this elasticity is asymmetric—are funds more likely to increase with positive shocks than decrease with negative shocks, or vice versa? Does this asymmetry vary between candidates and candidate types?

Finally, though not feasible for this study, Mutz (1995a; b) and Damore (1997) have both argued that the media play an important role in determining campaign contributions (and the effects of election events on contributions). Including this additional control for media coverage (both quantity and quality) may elucidate why the base contributors are more elastic with respect
to electoral conditions or why front-runners do not receive fundraising boosts following expectation increases. Each of these steps will help to explain the selection of the \textit{ex ante} front-runner and the difference between insurgents and persistent long-shots, thus illuminating the social choice of American presidents.
Appendix
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