Following the Money: The Responses of Political Actors to Betting Market Conditions and

Other Measures of Campaign Competitiveness

Research Thesis

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I.   Introduction

How elections are funded has changed substantially in the past 20 years. Courts and legislation have altered the extent to which private actors can support candidates through spending. One result of recent judicial decisions has been increased public scrutiny applied to independent expenditure actors. Another interesting phenomenon is the change in how elections are predicted. America has long-established strict rules regarding gambling, including outlawing real money gambling on election results. In 2014, a website called PredictIt was created by researchers at Victoria University Wellington that allowed Americans to gamble with real money on election results (PredictIt). It was able to gain approval from regulators by limiting transaction amounts and operating primarily as a research project. Extensive research has been conducted on these markets, some of which will be discussed below. In this paper, I attempt to answer the question: "Are political actors responsive to measures of campaign competitiveness when allocating money towards campaigns? And if so, what sources of information are they most responsive to?" Prediction market data from U.S. House elections in 2016 and 2018 are used and the associated campaigns independent expenditures are taken from the Federal Elections Commission. Other campaign-specific variables are accounted for as well. The implied competitiveness of prediction markets will be mediated by other sources of information that actors can use to make spending decisions. Thus, I will compare the effects prediction markets and these other sources of information have on independent expenditures. I hypothesize that the relationship between prediction market prices and independent expenditures resembles an upside-down parabola wherein independent expenditures rise until the maximum implied competitiveness is reached, at which point they will decrease. After accounting for other variables, however, there is not a significant relationship between independent expenditures and

prediction market prices. That said, the other sources of information have a significant effect on independent expenditures. Specifically, election competitiveness ratings derived from the Cook Political Report are significantly related to campaign spending in the parabolic way described earlier.

II.   Literature Review

To begin fitting prediction markets into the public opinion framework, one must first understand the mechanics of prediction markets. Recently, PredictIt has grown to become the dominant force in this type of market in the United States, likely due to its distinction as a research project allowing users to use real money in a way that would otherwise violate the law (PredictIt disclosures). A sufficient description of these markets is found in Joyce Berg, Forrest Nelson, and Thomas Retiz's "Prediction Market Accuracy in the Long Run" (Berg et al. 285). While the authors in that paper set out to describe the Iowa Election Market, the description still applies because PredictIt functions in a very similar way. In broad terms, users in these markets trade contracts that are priced based on the likelihood of a future event happening. In PredictIt's case, contracts that are validated (as in, the event occurs as prescribed in the contract) payout to $1. For example, a person may choose to buy contracts for a senator winning their election at 70 cents if they believe that there is a likely chance of that happening. As buyers and sellers interact, the price where offers converge can be thought of as the group sentiment of the market participants. So, in a given market, buyers and sellers will be constantly interacting until a seller offers a price that no buyer matches or vice versa. This is what someone would see as the 'price' associated with the market, and in PredictIt's case can be thought of as the percentage of that future event occurring. A distinguishing characteristic of real-money prediction markets like PredictIt, versus prediction platforms in which predictors have no material risk, is the predictor's

material leverage. A tenable assumption, therefore, is that users, especially in the aggregate, are more informed and attuned to political events than the average person. The implication is that the aggregate price of these markets should track well to actual results of elections.

After walking through the structure of prediction markets, Berg et al. evaluate their accuracy in predicting future elections. In doing so, they compared prediction market accuracy to polling accuracy. They generally found that markets were stronger predictive tools than polls, at least in the presidential elections from 1988-2004 that they studied (Berg et al. 288). This was true both within 5 days of the election and going back as far as 100 days before the election, with many of the results being significant (Berg et al. 295). This confirms a theoretical basis that the 'show don't tell' idea with regards to prediction markets can be effective, as in, asking voters to predict the future can be more productive than asking whom they will support. Public opinion can help political actors strategize, but those actors may do well to instead strategize based on how other informed members of the political process, market participants, predict the political landscape to be.

There is a rich literature on the relationship between public opinion and political actors. To begin, there has been a large debate over the idea of an informed public opinion itself, and whether it can be measured by surveys. Such conversations, while important, will not be delved into in this paper. Instead, I am more concerned with the effect public opinion has on how political actors behave, including whether it exists. James A. Stimson writes effectively in his book *Tides of Consent: How Public Opinion Shapes American Politics*, (Stimson, 2015). He describes various players in the political process and how public opinion shapes their actions. One of his focuses is campaign professionals. He notes their use of polls, "not so much to gauge momentum as to measure whether their ads are building the image they want" (Stimson 92). He

then reviews the complex predictive validity of polling but notes that they are more accurate later in the race. Stimson also describes the phenomenon of party actors reacting to public issue positions in a different chapter of *Tides of Consent*. He notes the intraparty conflict that can occur when the issue becomes strong enough to form a critical mass of support in the public. When that happens, party members that do not support it usually have to sign onto it, lest they risk estrangement from the party (Stimson 58). While this is not exactly candidate evaluation and campaigns reacting to that sentiment, it implies that political actors are in tune with what the public thinks and react based on it.

The extent to which political actors respond to public opinion on the form of policy has been extensively researched. In fact, Public Opinion Quarterly, a research journal, is devoted almost entirely to this phenomenon. Robert Shapiro wrote a review of V. O. Key, Jr.'s, Public Opinion and American Democracy, one of the seminal texts on the subject, in the journal as a sort of 'where are we now' on the research question (Shapiro 982). He summarizes the recent scholarship on the question and finds that the association between public opinion and policy is generally robust, though the idea of causality is a difficult challenge (Shapiro 985). The review is very broad and touches on many different areas of policy responsiveness to public opinion. He is quick to note the limits of the existing research in the area, especially around having "sufficient data over time for a wide range of issues… to allow the kind of broad coverage, temporal sequences, and multivariate analysis needed to make causal inferences about responsiveness…" (Shapiro 1003-1004). He proceeds to mention a broader difficulty in social science of not being able to directly observe phenomena to be able to tease out a cause and effect (Shapiro 1005). All of this is to say that while there is some evidence of political responsiveness to public opinion, it is important not to overstate that effect. It stands to reason, therefore, that the analysis I am

presenting that links political betting markets to campaign spending is necessarily incomplete and that it is exceedingly difficult to make causal claims based on the available evidence.

Martin Gilens' *Affluence and Influence: Economic Inequality and Political Power in America* (2012) is a strong tour of the literature of the relationship between political actors and public opinion, with the added wrinkle of exploring the influence of an uneven distribution of political power in this process. Chapter 6 discusses how elections induce responsiveness to public opinion in elected officials and party institutions. He notes Anthony Down's framework of political parties as office-seeking coalitions (Gilens 156). This harkens to Downs' classic *An Economic Theory of Political Action in a Democracy* (Downs). Although there has been debate about some of the assumptions of rationality made in the article, my analysis will, for clarity, assume a similar framework for political actors. That is to say that I will assume that parties and partisans will be inclined to support candidates that they think are likely to win elections and that they will react to polling and betting markets as a metric for informed predictions to do so. Gilens uses longitudinal surveys to examine how reactive congressional policies are to the desires of the public, differentiating respondents by income levels. His topline results in this chapter are that responsiveness is always there, but it increases during presidential election years, and that legislators are most responsive to the interest of high-income earners, which he defines as those in the 90th percentile of income (Gilens 164). While this information is not directly related to the research topic, it increases the theoretical expectations that parties are responsive to the public by demonstrating that legislators are tuned into elite opinion.

Having established the relationship between public opinion and the behavior of elite political actors, a question arises: is there a relationship between prediction market conditions and the behavior of political actors, namely their spending decisions? If it is the case that these

markets do fairly well in predicting political outcomes, especially in the longer term, as previously noted in Berg et al., it would be the case that political actors potentially behave strategically based on early market conditions. Namely, actors can take into account prediction markets when deciding how they choose to spend in elections. In this way, independent expenditures can paint the picture of how independent political actors choose to influence the political process. Richard N. Engstrom and Christopher Kenny analyzed the electoral effects of independent expenditures in their article "The Effects of Independent Expenditures in Senate Elections." (Engstrom and Kenny). Analyzing Senate elections in the 1980s and 1990s, they find that, generally, "independent spending by PACs can affect the vote decisions and that the effects are particularly evident when modeled as endogenous variables." (Engstrom and Kenny 896) That said, effects vary and can change over time. Therefore, independent actors can be reasonably confident in the influence their spending can have in a given election, solidifying the importance of strategic thinking when engaging in spending activity. Though one would be remiss to not mention that independent spending is not always conducted solely for the sake of helping a candidate win an election, nor is it the case that independent spending brings only positive effects for a political campaign. Diana Dwyre and Evelyn Braz note four distinct super PAC goals: candidate-specific advocacy, partisan advocacy, ideological advocacy, and access-oriented (Dwyre and Braz 254). Of these four, only access-oriented goals would seriously hinder the assumptions made for the analysis conducted in this paper, so it is encouraging that Dwyre and Braz note that access-oriented Super PACS make up a vanishingly small portion of total Super PAC activity. (Dwyre and Braz 257). Anne Baker's article "Help or Hindrance? Outside Group Advertising Expenditures in House Races" slightly calls into question the assumed positive impacts of independent spending (Baker 313). She makes a distinction between PACs

activities, which generally need to be documented, and what she terms 'dark money' organizations, 501©, that do not need to report spending for each specific candidate or race (Baker 315). One of her results is that the spending of these darker groups is more impactful in terms of affecting election outcomes than that of more conventional PACs. (Baker, 2018) In fact, she does not find a significant effect of PAC spending on early television advertisements on final vote margin at all (Baker 325). Having noted the strength of prediction markets in predicting elections, it would make sense that these actors would, or at least should, spend in part based on their conditions. My hypothesis, therefore, is that there will be a significantly positive relationship between independent expenditures and the competitiveness of elections implied by prediction markets. In this way, I assert that political actors, specifically those most in tune with political developments given they have the resources and desire to spend enough to be reported by the Federal Elections Commission, will be responsive in their spending based on what research shows is a moderately strong predictor of electoral success in prediction markets.

III.   Data

Data to complete the analysis came from multiple sources. For the prediction market prices, I requested data from all PredictIt markets that concerned congressional elections in 2016 and 2018. I excluded markets in which a single candidate was named, which was usually worded: "Will [candidate] be reelected as representative of [district]?" In this way, only two-sided markets were included. These markets either specified the primary party candidates' names or just contained the partisanship. The original data was structured so that each market was associated with an ID, with a different ID for each contract within the market, usually, one contract ID for each affirmative choice of a candidate winning, so two contract IDs for each market ID. For markets that did not specify candidate names, I used Ballotpedia to fill them in by

matching the election and candidate partisanship. Each observation in this dataset showed the opening, average, and closing price for each contract on each day. Markets varied in how long before the election they began, and some did not necessarily resolve on election day. For each election I considered, I found three values using PredictIt's data: opening price, average price over the course of the election, and price on election day. This allows one to analyze the relationship between independent campaign expenditures and market prices over time. For campaign spending data, I used Independent Expenditure data from the Federal Election Commission (Federal Election Commission, 2016 & 2018). Specifically, only money spent in support of a named candidate was used in this research, as the topic concerns how political actors act in relation to prediction markets, and spending against candidates is more likely to be indirectly related to the support of a candidate. I aggregated the individual contributions for each candidate for which there was a prediction market and linked the two datasets. Summary statistics for prediction market prices and independent expenditures are below.

Table 1:

| Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Opening Price (Cents)	183	53.464	23.398	1	35	74.5	98
Average Price (Cents)	183	52.134	24.490	5.319	34.333	71.548	96.096
Closing Price (Cents)	183	53.011	29.428	1	28	78.5	99
Independent Expenditures	183	732,758.90	1,025,416.00	0.00	55,379.85	923,342.20	5,235,640.00

The final dataset included daily trading activity for each contract of each market, spanning many of the markets focusing on Congressional elections run by PredictIt in 2016 and 2018, total independent expenditures in support of candidates of those elections, and Congressional District

level Presidential Election results for the associated districts. It is important to consider other ways in which they can predict the competitiveness of a given election, as their goal is the efficient allocation of funds. Additional information for each market included the election year, 2016 or 2018, the candidate's party affiliation, the Cook's Partisan Voting Index of that given district, a rating furnished by the Cook Political Report, and the incumbency status of the candidate. The Cook PVI measure was transformed so that it would be positive if the lean is towards the candidate's party, and negative if not. For example, if the PVI is R+5, a Democrat's PVI for the purpose of the data would be -5 and a Republican would be 5. For the Cook Political Report's race rating, which ranges from Likely Democratic, Lean Democratic, to Toss-up Democratic and vice versa for Republican. This variable was coded in a similar way to the PVI variable, where Likely Democratic was 3 if the associated candidate was a Democrat and -3 if the associated candidate was a Republican. Importantly, Cook did not rate elections that were not deemed competitive, so those elections to not have a value associated with them. This information is important because it notes other sources of information from which political actors can base their spending. The overall goal of this paper is to find whether these spenders make their decisions based on the information they can glean from prediction markets. The variety of sources specified can help do so.

IV. Discussion

To examine the relationship between independent expenditures and prediction market prices, I begin by separating the prices into three categories: market open, market average, and price near market close. While the total spending variable is fixed on reflects spending at the end of the market, these price distinctions are still useful in that it can provide an intuition of convergence over time between the two variables. The graph below shows the relationship of the

market prices across the three different categories to the spending of any given election, with a

LOESS smoothed line and 95% confidence interval.

Figure 1
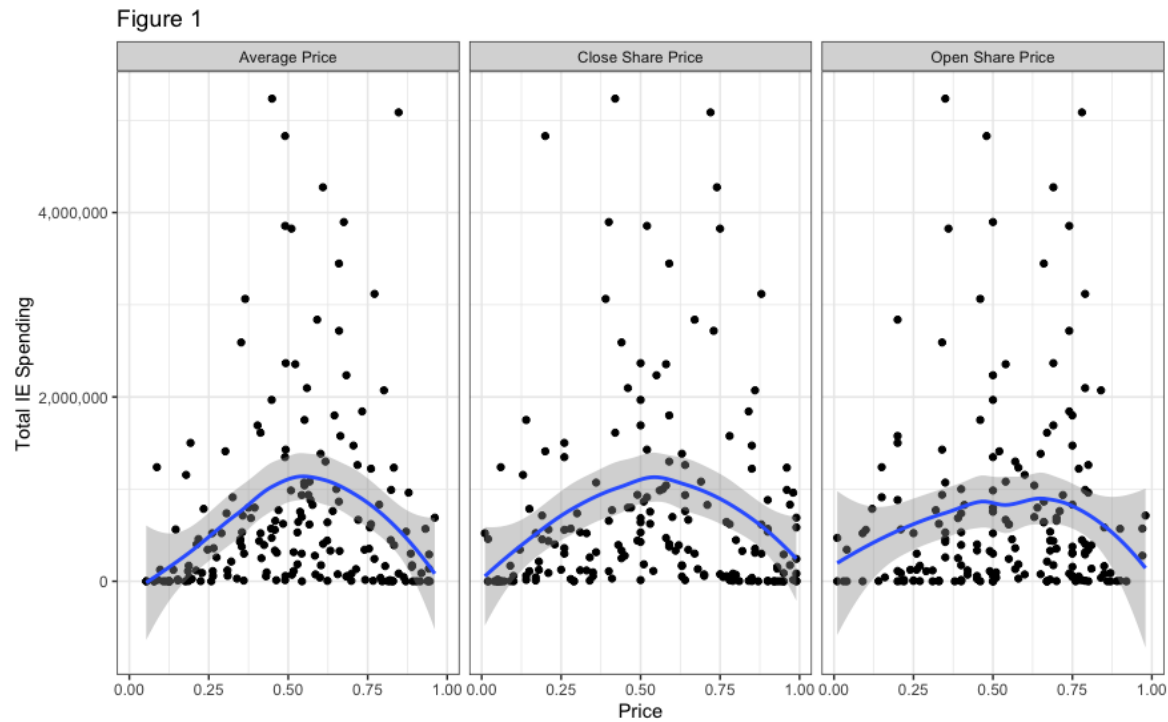
It is noteworthy that there seems to be an indication of responsiveness between total

spending and the competitiveness of an election as implied by pricing. In general, candidates

near the 50-cent mark have more money spent on their behalf than those whose contracts are

priced over 75 cents, implying a strong likelihood of victory, and those priced under 25 cents,

implying a strong likelihood of loss. There is evidence to believe, therefore, that donors

strategically spend their money based on a candidate's likelihood of victory. It is visually clear

that the relationship between independent expenditures and prediction market prices is nonlinear

and non-monotonic, implying that using ordinary least squares to estimate a statistical model

would be unwise as it is not clear what polynomial function best captures the relationship

between market price and total spending. The relationship resembles a negative quadratic curve

with a maximum of 50 cents, especially when the price reflects the average market price and the

closing market price. One can intuit, therefore, that not only do donors strategically spend their money, but their spending more closely reflects the implied competitiveness as the election proceeds. With this in mind, my hypothesis is that there is a statistically strong relationship between prediction market price and independent expenditures towards a given election. This would support the idea that funding is allocated efficiently between people who spend money to support elections and candidates of those races. However, it is important to note that other information can lead people to make electoral funding decisions. Thus, one must build a model that isolates the effects of the multiple different information streams at an independent expender's disposal.

I used a generalized additive model (GAM) to describe the relationship. Developed by Trevor Hastie and Robert Tibshirani, this method allows for independent variables to be smoothed to capture the nonlinear effect (Hastie and Tibshirani 298). It can also effectively include linear parameters in its specification, with coefficient interpreted the same way one would interpret coefficient in ordinary least squares. The reported estimates of the smoothed terms, however, are interpreted differently. When the independent variable is smoothed, "Each smooth is the sum of a number of basis functions, and each basis function is multiplied by a coefficient, each of which is a parameter in the model," producing many different coefficients (Ross). Instead, the effective degrees of freedom (edf) is reported, representing the "complexity of the smooth." (Ross). This estimate can best be thought of as the polynomial term associated with $y = f(x)$ (Petukhina, et al. 4). Thus, "An edf of 2 is equivalent to a quadratic curve" (Ross). Three different models were used, to capture the three different types of market prices that were defined in the dataset. The specifications are below, for each candidate i in each election.

$$(1) \; total \; IE \; Spending_i \; = \; \alpha + \; \beta_1(Party: R_i) + \; \beta_2(Incumbent_i) + \; \beta_3(Year: 2018_i)$$

$$+ \; \beta_4(Open \; Price \; (Cents)_i) + \; \beta_4(Cook's \; PVI_i) + \; \beta_4(Cook's \; Rating_i) + \; \varepsilon$$

$$(2) \; total \; IE \; Spending_i \; = \; \alpha + \; \beta_1(Party: R_i) + \; \beta_2(Incumbent_i) + \; \beta_3(Year: 2018_i)$$

$$+ \; \beta_4(Average \; Price \; (Cents)_i) + \; \beta_4(Cook's \; PVI_i) + \; \beta_4(Cook's \; Rating_i) + \; \varepsilon$$

$$(3) \; total \; IE \; Spending_i \; = \; \alpha + \; \beta_1(Party: R_i) + \; \beta_2(Incumbent_i) + \; \beta_3(Year: 2018_i)$$

$$+ \; \beta_4(Close \; Price \; (Cents)_i) + \; \beta_4(Cook's \; PVI_i) + \; \beta_4(Cook's \; Rating_i) + \; \varepsilon$$

The results are found in Tables 2, 3, and 4 below. The results fit into the hypothesis that independent political actors spend strategically according to the implied competitiveness of a candidate in an election, as measured by the price of that candidate's contract in a betting market. In all three cases, the edf of the price variable was very close to 2, implying a quadratic relationship in which spending increases towards a certain point, after which it decreases. The term, however, is not significant. The edf associated with Cook's Ratings for elections, however, is significant in the opening price and closing price models. It, in a similar way to the price variable itself, implies a slightly more complicated quadratic relationship. The other independent variables also have interesting results. Incumbency is not a significant predictor of total spending, perhaps because incumbents are more likely to be clear favorites than challengers. They could also be more likely to benefit from party operations outside of the independent expenditure space. In all of the models, Republicans received less money from independent expenditures than Democrats. Importantly, as discussed earlier, this is just one category of spending that, distinctively, needs to be reported. There are categories of election spending that

do not fall under independent expenditures and its reporting requirements. It would make sense

that the smoothed term for Cook's PVI would be similar to that of market price, but the

relationship is not as clear. This may be because of the lower variation of the PVI. Overall, there

is no evidence that, controlling for the estimated independent variables, total average market

price and the market price close to an election is strongly related to independent expenditures,

implying an affinity towards competitive elections by political actors. Rather, the ratings from

Cook's Political Report are more predictive of independent expenditures. This leads one to

conclude that people who make independent expenditures do not respond to the information

gleaned from political betting markets as much as they do the information from the media.

Table 2:

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
(Intercept)	865502.0315	237067.8684	3.6509	0.0004
Party: R	-829447.3323	272603.3107	-3.0427	0.0028
Incumbent	86322.7794	213998.4145	0.4034	0.6873
Year: 2018	536782.0452	201217.0206	2.6677	0.0085
B. smooth terms	edf	Ref.df	F-value	p-value
Average Price (Cents)	2.1456	2.7314	1.9745	0.1040
Cook's PVI Towards Candidate	2.0080	2.6050	0.5693	0.4925
Cook's Rating	2.6183	3.2586	2.6065	0.0531

Table 3:

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
(Intercept)	930914.3372	235144.1003	3.9589	0.0001
Party: R	-842369.9213	265478.8559	-3.1730	0.0018
Incumbent	69178.6035	217540.4147	0.3180	0.7509
Year: 2018	472161.8742	202992.4098	2.3260	0.0214
B. smooth terms	edf	Ref.df	F-value	p-value
Opening Price (Cents)	1.3270	1.5871	0.1545	0.7120
Cook's PVI Towards Candidate	1.7219	2.2096	0.3923	0.6238
Cook's Rating	2.6672	3.3083	4.9156	0.0022

Table 4:

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
(Intercept)	943783.3180	235388.1215	4.0095	0.0001
Party: R	-849004.8615	264601.8220	-3.2086	0.0016
Incumbent	74748.2158	217017.3456	0.3444	0.7310
Year: 2018	457896.2888	202395.0081	2.2624	0.0251
B. smooth terms	edf	Ref.df	F-value	p-value
Closing Price (Cents)	1.4916	1.8269	0.4106	0.6075
Cook's PVI Towards Candidate	1.8065	2.3299	0.4346	0.5850
Cook's Rating	2.6007	3.2258	3.8054	0.0105

V.   Conclusion

This paper extends the existing literature on how political actors behave during elections. It proposes a new mechanism, political betting markets, to which actors respond. The results show that after controlling for other variables, there is not a significant relationship between betting market prices and the independent expenditures of associated campaigns. That is not to say, however, that no relationship exists at all. There is an association between the two measures. Other sources of information on electoral conditions, as specified in the model, specifically election ratings form Cook's Political Report, affect how expenditures are distributed. In this way, there is evidence that actors allocate their resources at least in part by how competitive they see a given election. Future studies can examine different types of elections and different forms of spending to examine the behavioral impact of betting market prices. As these types of markets grow in popularity, it will be useful to compare their results to that of journalistic prognosticators and measures of public opinion. The issue of the effectiveness of campaign contributions is heavily contested in political science. This paper has pointed to there being at least *some*

strategic decision-making on the part of campaign spenders. That is, they tend to support

competitive candidates more than non-competitive ones.

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