# Extending the Brams-Kilgour Model Linking Partisan Imbalance in Non-Competitive States to Outcomes in the Electoral College Using Historical Data from 1868 to 2016\*

# Jonathan R. Cervas Bernard Grofman

# School of Social Sciences, University of California, Irvine

# May 20, 2017 | 3:44 PM

Version 5

\*Work on this project was supported by the Jack W. Peltason (Bren Foundation) Chair at the University of California, Irvine. The first named author is a graduate student in political science at the University of California, Irvine. The second named author is a Professor of Political Science at UCI and the Peltason Chair of Democracy Studies. Correspondence for this paper should be directed to Jonathan Cervas <JCervas@uci.edu>.

# ABSTRACT

*Brams and Kilgour (2017) begin their essay by pointing out the obvious, but nonetheless regularly neglected, fact that states that are non-competitive may have a decisive impact on Electoral College (EC) outcomes and shape the electoral strategies of the candidates in the competitive states, especially if there is asymmetry in the partisan balance in the non-competitive states. Their contribution is to offer combinatoric insights into the implications of such asymmetries in the form of three new indicators: Winningness, Vulnerability, and Fragility. They then explore the magnitude and effects of these three measures for the presidential elections of 2000, 2004, 2008, and 2012. A main contribution of this note is to extend their analyses of these measures to an additional 34 elections: every election in the modern two-party post-Civil War era from 1868 through 2016. Inspired by their work, we also offer a new and simpler metric for partisan asymmetries in noncompetitive states and show how it can predict the expected closeness of EC outcomes as well or better than the more complex combinatorics measures.*

# I. Introduction

The Electoral College (EC) is often criticized because the logic of campaigning under the EC’s weighted voting rule makes each party’s presidential campaign focus exclusively on *battleground states*, i.e., states characterized as competitive. Such states can, over the course of a campaign, “swing” toward one candidate or the other. Often such states are taken -- wrongly as we shall see -- to be the ones that are solely determinative of the presidential winner. Even fewer states, the largest of the battleground states in terms of EC votes, are often seen as especially critical, while a large majority of states have seemingly no power to determine the president since, for all practical purposes, the outcomes in those states cannot be changed by the presidential campaign.  It is also well known that it is the potentially pivotal states that get all the attention from the candidates and the media.

The view that the states which are non-competitive are therefore made irrelevant has been challenged by Bram's and Kilgour (2017).[[1]](#footnote-1) These authors point out that each candidate’s electoral votes can be thought of as coming from two sources: noncompetitive states—with outcomes effectively decided before the election—and the competitive states that support him or her on election day. Thus, the readily foreseeable outcomes in non-competitive states can create a “loading of the dice” in an election, by requiring the candidate with fewer expected easy victories to do remarkably well in the more competitive states in order to win. For example, in 2012, Brams and Kilgour point out (p. 101): “Because Barack Obama had a 233–191 electoral vote lead over Mitt Romney in the 42 noncompetitive states and the District of Columbia, he needed only 37 of the 114 electoral votes in the competitive states to win with a majority of 270 electoral votes, whereas Romney needed 79.” Indeed, at the extreme, we can imagine the outcomes in states essentially safe for one party might involve enough votes so as to render outcomes in the more competitive states the ones that are irrelevant. [[2]](#footnote-2)

Brams and Kilgour specify an indicator, *Winningness*, of the extent to which the virtually certain outcomes in non-competitive states structure the expected outcome of the overall election in a two candidate contest. If we, for simplicity, posit that each of the battleground states is equally likely to go for either candidate, and there is *m* such states, then *Winningness* is the proportion of the 2*m* combinations of zeroes and ones in which the candidate who is ahead in the non-competitive states is the winner (adding the seats won in competitive states found in that particular combination to the already “known” votes in the non-competitive states). Note that the greater the advantage a given candidate has in the non-competitive states, the greater will be the expected proportion of the 2*m* outcomes in which that candidate is the winner of an Electoral College majority, since the candidate ahead in seats won in non-competitive states will need fewer seats won from the competitive seats to amass a winning majority than will the other candidate. In 2012, with *m=*8 competitive states, Brams and Kilgour point out (p. 101) that 207 (80.9%) of the 256 splits would result in a win for Obama, whereas only 49 (19.1%) would result in a win for Romney, giving Obama 4.22 times more ways of winning than Romney.”

Brams and Kilgour (2017: 101-2) offer two other closely linked indicators that can be used to measure the extent to which outcomes are predictable: *Vulnerability* and *Fragility*. *Vulnerability* is defined as “the proportion of the coalitions in competitive states in which a single competitive state, by switching to the other candidate, either can cause a change in the winner or create a tie …;” while “*Fragility* is measured by the expected number of competitive states in a winning coalition that can disrupt victory in this way.”

Brams and Kilgour, using a definition of *non-competitive state* as one where the winner’s vote share is expected to be above 53%, calculate *Winningness*, *Vulnerability*, and *Fragility* for four recent elections: 2000, 2004, 2008, and 2012.  In the next section we extend their analysis to include all 38 presidential elections in the modern two-party era, from 1868-2016.  We look at the correlations of their measures over the entire time period and we consider how well each (and all three together) allow us to predict EC winners and EC seat shares in these 38 elections, and we discuss the question of how well an *ex post* measure of non-competitive states relates to expectations about non-competitiveness *ex ante*. In an Appendix, we consider how analyses would change if we changed the definition of non-competitive state.While the analyses in the Appendix show that our choice of range to define a competitive state can matter a great deal, to maximize our compatibility with Brams and Kilgour (2017), and because we think this definition is a plausible one in the context of our attempts at predicting EC outcomes, we will use the Brams and Kilgour (2017) plus or minus three percentage point definition of competitive state throughout the essay.

In the subsequent section, we offer a simple alternative measure based on the Brams and Kilgour intuition about the importance of the imbalance in partisan breakdown of EC seat shares in the non-competitive states. We show that this measure, when coupled with an indicator of the proportion of EC votes that are found in the non-competitive states, is even more highly predictive of the final EC outcomes and EC seat percentages than any single one of the measures proposed by Brams and Kilgour.

**II. *Winningness*, *Vulnerability*, and *Fragility*: 1868-2016**

For the Electoral College for the entire modern two-party era, 1868-2016, we show in Table 1 *ex post* values for the Democratic and Republican EC seat shares in the noncompetitive states in the first two columns, and we show the final EC seat tallies for both parties, both as numbers and as a percentage.[[3]](#footnote-3) In addition, we provide a column that has the *difference* between the Democratic and Republican EC seats in the noncompetitive states, and a further column that shows that difference normalized by total EC seats.[[4]](#footnote-4) Similarly, we show in Table 2 values of *Winningness*, *Vulnerability*, and *Fragility*.

**<< Tables 1 and 2 about here>>**

We see from Table 2 that, in the majority of years, *Winningness* is such that the outcome is expected to be determined solely by what happens in the non-competitive states, i.e., a *Winningness* values of zero or one. In the four elections analyzed in Brams and Kilgour (2017), only one, 2008, fell into this category. Had Brams and Kilgour extended their data back somewhat further in time to 1980, however, they would have found that in that election and in each of the four following elections, one of the two candidates had locked up enough votes in non-competitive states to win the election.[[5]](#footnote-5)

Table 3 looks at the correlations among the *Winningness*, *Vulnerability*, and *Fragility* variables, and EC seat share. For *Vulnerability*, and *Fragility* we must report results separately for the Republicans and the Democrats. ~~For~~ *~~Winningness~~* ~~it does not really matter which party we analyze since we are doing all analyses in terms of the two party vote, and thus~~ The *Winningness* value for the Democratic candidate is simply the negative of the *Winningnes*s value for the Republican candidate. For comparability with the two variables defined only for particular parties, we also report *Winningness* values both for the Republican and for the Democrat. *Winningness* is defined for all elections, so that we can run its correlation with the EC outcome for the entire data set. But the other pairwise Pearson correlations reported in Table 3 are only for values of *Vulnerability* and *Fragility* that are defined and not zero, i.e., for the elections whose outcomes can be effected by what happens in the competitive states (17 of 38 elections).

**<< Table 3 about here>>**

We see from Table 3 that, as commonsense would predict, when *Winningness* is high, *Vulnerablity* and *Fragility* are both low. The absolute value of the correlations among this set of variables is very high. For example, the correlation between Democratic *Vulnerability* and Democratic *Fragility* is r=0.89**,** whilethe correlation between Republican *Vulnerability* and Republican *Fragility* is r=0.71**.**

While the various measures proposed by Brams and Kilgour (2017) are of theoretical interest, in and of themselves, we are most interested in how these measures allow us to address the bias imposed on likely Electoral College outcomes of having a substantial proportion of seat outcomes already known in advance in a fashion that favors one political party. Brams and Kilgour note (2017: 111) that the sign on the *Winningness* advantage correctly predicts the winners in all four of the presidential contests they study. When we replicate that analysis for all 38 elections, we find that this holds for all but two elections: 1880 and 1960. This is a very good predictive performance by the *Winningnes*s variable. Even if we consider just the 17 elections where the winner was determined by the competitive states, this is a success rate of 88%.[[6]](#footnote-6)

A more difficult test for the predictive usefulness of *Winningness* and the other two variables is to ask how well they, singly or collectively*,* predict final EC seat share outcomes. These three variables are, in fact, highly correlated with EC outcomes. ~~we still find~~ *Winningness* very highly and positively correlated with EC outcomes (r=0.90). The correlation between EC outcomes and Republican *Fragility* is -0.76, while it is -0.67 with Democratic *Fragility*. The correlation between EC outcomes andRepublican *Vulnerability* is -0.66, while it is -0.81 with Democratic *Vulnerability*. **The high proportion of cases for which *Winningness* is either 0 or 1 somewhat exaggerates its power to predict final seat shares.** When we restrict *Winningness* to values between 0 and 1 (i.e., the values for which *Vulnerability* is defined), its correlation with EC outcomes declines to 0.73. In such cases, *Vulnerability* is the most highly correlated single variable with the EC outcome for the Democratic candidates, but *Fragility* is the most highly correlated for the Republican candidates.

We have done regression analyses with all three Brams-Kilgour measures as independent variables and EC Democratic share as the dependent variable, but we do not report results for these models since, as expected, the very high correlations among the three variables meant that adding *Vulnerability* and/or *Fragility* to *Winningness* did not increase the adjusted R2, and only one of the three variables was statistically significant in any of the models.[[7]](#footnote-7) We find that the best fitting model in terms of adjusted R2 is the one where we simply use *Winningness* to predict the EC outcome, with an adjusted R2 value of 0.81.[[8]](#footnote-8)

**Accuracy of ex post classification of states as non-competitive**

B-K first justify the use of the ex-post criterion by which they classify competitive and non-competitive states by pointing out that ±3% corresponds with the usual pre-election poll margin of error.[[9]](#footnote-9) Second, they point out that, empirically, there is a very good fit between *ex ante* and *ex post* evaluations of competitive states.[[10]](#footnote-10) For example, in 2012, B-K note that 99.6% of advertising money was spent in the ten states identified as battlegrounds by FairVote.org. Of those ten states, eight are included in the *post hoc* set of competitive states, while the other two were the next closest states in terms of margin of victory. In the 2016 election, the campaigns and campaign related PACs spent 82% of advertising money in the states retrospectively classified as competitive.[[11]](#footnote-11) Moreover, the only competitive state not targeted by either campaign was Minnesota, a state that holds the longest win streak for Democratic candidates. Similarly, in 2016, if we look at candidate rallies or events where the presidential or vice-presidential candidate was present, the major party candidates held 79% of all events in the 13 states which post-hoc we are labeling competitive. In 2012, 87% of campaign events were held in the set 8 states viewed post-hoc as competitive.[[12]](#footnote-12) **A similar pattern occurs in 2004, when 85% of campaign events were held in the 12 battleground states (Shaw 2006).** We would not expect the only campaign spending or only campaign appearances to be in competitive states, since candidates also spend some money and make some appearances for reasons not directly related to boosting their own campaign chances, e.g., to help down-ticket candidates or to build for the future. [[13]](#footnote-13)

**Except for 1976,** [[14]](#footnote-14) **we do not have compiled data of this sort for other presidential election years. POTENTIALLY WE CAN GET DATA FROM MANY OTHER ELECTIONS IN ONE FOR OR ANOTHER, AT LEAST BACK TO A CERTAIN POINT. IN FACT, SHAW (1999B) HAS DATA FOR 1988, 1992, AND 1996. HOW MANY YEARS DO WE WANT, AND MAYBE JUST GET ALL AVAILABLE DATA AND PUT IN APPENDIX? ALSO, SHOULD I PREPARE THIS DATA FOR ±5% IN APPENDIX?** The presidential election of 1976 shows a similar pattern of campaign activities focused on the competitive states, though there were many more (25) competitive states in 1976 than in the two most recent elections of 2012 and 2016. In 1976, 78% of all campaign events were held in the 25 battleground states, and 78% of all campaign television and radio ads were held there.

**III. An Alternative Way to Make Use of Partisan Imbalance in Non-Competitive States to Predict EC Outcomes**

We, like Brams and Kilgour (2017), believe that outcomes in non-competitive states are critical in understanding final Electoral College winners. In this section we capitalize on that insight by offering two simple measures that we show jointly performs as well or better as the Brams-Kilgour variables in predicting final EC outcomes.

To present our measure, some notation is useful. We may partition the states into the set of competitive states, Cj and the set of non-competitive states, NCi, **where *i* indicates the election year**. The EC seats in a competitive state are labeled as s(Cj) and the EC seats in a non-competitive state are labeled as s(NCj). We have s(EC) = s(Cj) + s(NCj). The noncompetitive states won by Democrats we label NCD, and the non-competitive states won by Democrats we label NCR. The seats in the non-competitive states won by the Democrats are thus labeled s(NCD) and the seats in the non-competitive states won by Republicans are thus labeled s(NCR).

We will be interested, on the one hand, on the partisan balance of seats in the non-competitive states and, on the other hand, on the share of the states that fall into the non-competitive category. We define our variable of interest as the difference between the two-candidate’s non-competitive electoral totals, divided by the total number of EC seats

*Non-Competitive Advantage* = [s(NCD) - s(NCR)]/s(EC)

This measure is standardized, thus allowing us to compare its effects across elections.  When one party has a big advantage in non-competitive electoral votes, they will be more likely to win the election.   Bram's and Kilgour reflect this intuition by examining coalitions among competitive states, and determining outcomes under the explicit assumptions that the competitive state outcomes occur independently of one another and with an equal probability of victory for the two parties in each. [[15]](#footnote-15)  We do not require either of these strong assumptions. But exactly the same intuition drives our model as that in the work of Brams and Kilgour, namely that the candidate that has a bigger advantage in electors from the non-competitive states will have more options in terms of possible wins in competitive states leading to Electoral College victory.

We first test the predictive usefulness of our *Non-Competitive Advantage* variable by looking to see how often the party with the advantage in the non-competitive states wins the EC vote. As does the *Winningness* measure, in all four of the elections from 2000 through 2012, *Non-Competitive Advantage* correctly predicts the presidential outcome. Indeed, we find that in just 3 of the 38 elections does the party with a *Non-Competitive Advantage* not go on to win the election, including the same two that *Winningness* fails to predict. In the three elections that fail under this classification, the partisan gap in non-competitive seats is very low, and thus the election is hard to predict. This is particularly true in 2016, when the *Non-Competitive Advantage* was just one seat -- in favor of the candidate who won the Popular Vote but lost the Electoral College.

Next, we regress Republican EC seat share on the *Non-Competitive Advantage* variable*.* Here we find (see Table 4) a very strong and significant relationship between the two measures, and the simple regression between them yields an adjusted R2 of 0.95. We can compare this regression with one that models the same dependent variable with *Winningness* as the predictive variable. As noted earlier, the adjusted R2 of the *Winningness* model is 0.81, which is considerably lower than that for *Non-Competitive Advantage* at 0.96. *[[16]](#footnote-16)* Whilethe very simple *Non-Competitive Advantage* variable does better in predicting final seat shares than any (or all) of the three variables from Brams-Kilgour (2017), *Winningness* does better at predicting the directionality of EC outcomes, since it fails to predict just two elections (out of 38) rather than the three mispredicted by the *Non-Competitive Advantage* variable.

**<<Table 4 about here>>**

# IV. Discussion

Brams and Kilgour (2017) begin by suggesting that the set-up power of non-competitive states dictate the terms under which a presidential election is contested. We agree. While competitive states receive the bulk of campaign activities like television and radio advertising, campaign field offices, and visits from the candidates and their surrogates, the media “horse-race” coverage about ‘swing states’ and ‘battleground states’ takes attention away from the extent to which safe seats matter for election outcomes. Partisan balance in non-competitive states matters since the candidate who enjoys a *Non-Competitive Advantage* has many additional pathways to the presidency, and thus one candidate can begin the presidential contest severely handicapped.

We have extended B-K’s analyses of *Winningness*, *Vulnerability* and *Fragility* beyond the four recent elections they analyze, to include not just 2016, but all elections between 1868 and 2016. Thus, we have added 34 elections to the analyses. We also added a new and simpler variable based on the logic of the B-K argument, namely, *Non-Competitive Advantage,* defined as the difference in safe EC seats between the parties, normalized by total EC seats. We find that the candidate that holds the edge in *Winningness* has gone on to win in all but 2 of the 38 elections since 1868, while the candidates with *Non-Competitive Advantage* has gone on to win all but 3 of the 38 since 1868. In the mispredicted cases, either the partisan advantage in non-competitive seats was very slim, and/or there was a divergence between the popular vote winner and the EC outcome. When we move from attempting to predict a dichotomous outcome variable to seeking to predict final EC vote shares, we find that both *Winningness* and our new *Non-Competitive Advantage* variable are both highly predictive of EC seat shares, but now the predictive edge is with the simpler variable, since it is a continuous variable rather than a dichotomy **(**R2 of 0.95 vs. one of 0.81). [[17]](#footnote-17)We take these results to be highly supportive of the basic B-K intuition:the candidate that has more potential paths to victory is far more likely to win the election.

APPENDIX:

How Analyses Would Change if We Changed the Definition of Non-Competitive State

Brams and Kilgour (2017: 110-111) discuss their choice of the domain of competitiveness as plus or minus three percentage points of two-party vote. One justification is that this range is close to the usual margin of error in state polls.  A second justification for this choice of range is a pragmatic one: there are computability issues in that, when we expand the range of competition, we have many more combinations to analyze. But there is also a good theoretical reason to favor this choice: for this range, the assumption they use that all states in this range had an *a priori* equal probability of being won by either party seems plausible.  Nonetheless, it is useful to consider the robustness of their measures to alternative specifications of the range used to define a competitive seat. In Table A1, for the four elections they consider, and for 2016, we show the comparisons between the values they derive for a plus or minus three percentage point definition and the more conventional plus or minus five percentage point definition of a competitive state.

**<< Table A1 about here >>**

Increasing the number of states defined as competitive does not give any expectation of a monotonic change in the three variables. It’s possible that the new states are more (less) vulnerable or more (less) fragile than those previously included. Likewise, while a candidate might do especially well in the most competitive states, the differing electoral values of states that are less competitive might change the ratio of coalitions they might be expected to win. For instance, if a large state is just outside the competitive range under the narrow definition, but enter the coalitions under the less restrictive definition, it could increase the number of coalitions wins for the disfavored party, but not change anything for the leading party’s candidate. In both 2000 and 2016, years in which the popular vote and the Electoral College diverge, when we change the definition of competitive state to plus or minus five percentage points the candidate with the higher *Winningness* is no longer the winning candidate in the election. [[18]](#footnote-18)

**Table A1: Comparisons of Results for the Winningness, Vulnerability, and Fragility Variables for the Republicans for a Plus or Minus Three Percentage Point and a Plus or Minus Five Percentage Point Definition of Competitive State: 2000-2016**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | **Competitive States**  **(ECvotes)** | | **Winningness**  **(Ratio)** | | **Vulnerability**  **(Ratio)** | | **Fragility**  **(Ratio)** | |
| **±3** | **±5** | **±3** | **±5** | **±3** | **±5** | **±3** | **±5** |
| 2000 | 16 (178) | 21 (221) | 1.71 | 0.50 | 0.76 | 1.47 | 0.59 | 2.00 |
| 2004 | 12 (142) | 20 (209) | 2.64 | 2.9 | 0.61 | 0.55 | 0.38 | 0.35 |
| 2008 | 7 (102) | 15 (159) | 0 | 0 |  | 125.92 |  | 1187.27 |
| 2012 | 8 (114) | 15 (193) | 0.24 | 0.35 | 2.09 | 1.85 | 4.22 | 2.83 |
| 2016 | 12 (163) | 16 (224) | 1.03 | 0.31 | 0.99 | 1.89 | 0.97 | 3.22 |
| *Note: All ratios are REP over DEM, therefore when the ratio is 1, both candidates have the same number of coalitions.* | | | | | | | | |

From Table A1 we see that in some cases the changes are very slim, even considering increasing number of competitive states, while in other cases the differences are drastic. Take 2016, for instance; the number of competitive states increases by just three, but the Republican candidate goes from a slight favorite to a big underdog, as judged by *Winningness*. In the states that finished with the winning candidate garnering less than 53% of the vote, Trump would have, if flipping a fair coin, won 3% more of the coalitions than Clinton. In those states that the winner gained less than 55% of the vote, Clinton would have instead won 3.3 times more of the coalitions! The same is true of 2000, when Bush had a slight advantage in states with the lesser margin of victory, had many less outlets to victory in the less restrictive plus or minus five percent. 2004 and 2012 offer competing narratives; although the amount of states drastically increases, only incremental deviations occur among the variables. The Republican candidates in each of these elections gain a slightly higher percentage of winning coalitions, while in both cases decreasing their *vulnerability* and *fragility* among those coalitions. In 2008, Obama remains far enough ahead in non-competitive states that the election is still not within a competitive range for McCain.[[19]](#footnote-19)

Changing the states that are considered competitive likewise changes the number of seats from the competitive states a party needs to win the election. In the parlance of Banzhaf (1968), we might say it changes the *quota*, or the number of EC seats a candidate needs to win.

Whereas Obama had enough EC seats in the non-competitive states in 2008 using the plus or minus 3% definition,[[20]](#footnote-20) he was twelve seats shy of victory using the less restrictive plus or minus 5% definition. While Obama remained the favorite even when we expand the definition of competitive states, under the former definition, Obama’s *quota* is effectively zero in the competitive states, while under the latter definition it becomes twelve.[[21]](#footnote-21)

The 2016 election works in the opposite direction from 2008. When we switch from a plus or minus 3 percentage point definition of competitive to a plus or minus 5 percentage point definition of competitive, a 2016 election previously characterized as close now is seen as less close.Using Brams and Kilgour’s definition of competitive, Donald Trump had a one seat EC lead in non-competitive states, and by virtue of winning the majority of the competitive EC seats, won the election. Using the more traditional plus or minus 5%, Clinton would have had a 50 EC seat advantage, having 182 safe EC seats toTrump’s 132. *Winningness* would have predicted a Clinton victory and, given the size of the *Winningness* score (0.77), she would be predicted to win by a large margin.[[22]](#footnote-22) Of course, as we know from polling, all predictions have a margin of error, and the fact that we might give high odds that a given candidate will win does not mean that her election is a certainty.

Appendix II: How Regression Analyses Would Change when we Change the Definition of Non-Competitive State

**Table A2: Correlations between variables ±5%**

|  |
| --- |
| **Democratic Correlations [Full Model]**  ==============================================================  Winningness Vulnerability Fragility EC Outcomes  --------------------------------------------------------------  Winningness 1 -0.974 -0.871 0.898  Vulnerability -0.974 1 0.809 -0.907  Frragility -0.871 0.809 1 -0.779  EC Outcome 0.898 -0.907 -0.779 1  --------------------------------------------------------------  Notes: Competitive State defined as being Plus or Minus 5% |
| **Democratic Correlations [Restricted Model]**  ==============================================================  Winningness Vulnerability Fragility EC Outcomes  --------------------------------------------------------------  Winningness 1 -0.975 -0.857 0.869  Vulnerability -0.975 1 0.797 -0.897  Fragility -0.857 0.797 1 -0.824  EC.Outcome 0.869 -0.897 -0.824 1  --------------------------------------------------------------  Notes: Competitive State defined as being Plus or Minus 5% |
| **Republican Correlations [Full Model]**  ==============================================================  Winningness Vulnerability Fragility EC Outcomes  --------------------------------------------------------------  Winningness 1 -0.987 -0.902 0.898  Vulnerability -0.987 1 0.862 -0.890  Fragility -0.902 0.862 1 -0.846  EC Outcome 0.898 -0.890 -0.846 1  --------------------------------------------------------------  *Notes: Competitive State defined as being Plus or Minus 5%* |
| **Republican Correlations [Restricted Model]**  ==============================================================  Winningness Vulnerability Fragility EC Outcomes  --------------------------------------------------------------  Winningness 1 -0.983 -0.868 0.869  Vulnerability -0.983 1 0.817 -0.855  Fragility -0.868 0.817 1 -0.827  EC Outcome 0.869 -0.855 -0.827 1  --------------------------------------------------------------  *Notes: Competitive State defined as being Plus or Minus 5%* |

Regression models using ±5%

# **When expanding the number of states considered competitive, we can make predictions about more elections. When competitive states were only those with whom the leading candidate had no larger than 53% of the two-party vote, 17 elections were available to make predictions. When expanding competitive to include states with the leading party getting up to 55% of the two-party vote, we can now make predictions for 24 elections. As judged by the R2 in the following regression tables, our predictions are less reliable than with the former definition, but we still do a very good job of predicting the eventual EC winner.**

**Table A3: Regressing Non-Competitive Advantage and Winningness on EC Outcomes when Defining Competitive by plus or minus Five Percent**

|  |
| --- |
| **Dependent Variable: EC Outcomes**  -----------------------------------  **Full Model Restricted Model**  **(1) (2) (3) (4)**  -------------------------------------------------------------  ***Non-Competitive Advantage*** 0.568\*\*\* 0.696\*\*\*  (0.026) (0.067)    ***Winningness*** 0.551\*\*\* 0.432\*\*\*  (0.046) (0.055)    ***Constant*** 0.522\*\*\* 0.255\*\*\* 0.530\*\*\* 0.333\*\*\*  (0.011) (0.031) (0.016) (0.032)    -------------------------------------------------------------  Restricted Model NO NO YES YES  Observations 38 36 24 22  Adjusted R2 0.929 0.801 0.821 0.742  =============================================================  *Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01* |

**We can also model *Non-Competitive Advantage* using a logit link function, where elections where Republican candidate wins takes on a value of 1 and when the Democratic candidate wins it takes the value 0. We then use this model to get the predicted probability of Republican victory. The results are shown below in Table A4.**

**Table A4: Predicted Probability of Republican Victory Across the Range of Non-Competititve Advantage**

|  |  |
| --- | --- |
| ±3% Non-Competitive Advantage Logit Model Predictions  ======================  Year Prediction Actual  ----------------------  1868 100 72.5  1872 100 82  1876 6.5 49.7  1880 21.3 57.7  1884 23.6 45.4  1888 71.1 58.1  1892 19.9 39  1896 97.6 61.1  1900 99.8 65.3  1904 100 72.1  1908 99.9 67.7  1912 0 4.3  1916 22.1 48  1920 100 76.1  1924 100 74.4  1928 100 83.6  1932 0 11.1  1936 0 1.5  1940 0 15.4  1944 0.1 18.6  1948 0.2 37.7  1952 100 83.2  1956 100 86.1  1960 88.1 41  1964 0 9.7  1968 96.4 59.5  1972 100 96.8  1976 18.8 44.8  1980 100 90.9  1984 100 97.6  1988 100 79.2  1992 0.1 31.2  1996 0 29.6  2000 72.5 50.4  2004 80.4 53.2  2008 0.6 32.3  2012 22.4 38.3  2016 58.5 56.7  ---------------------- | ±5% Non-Competitive Advantage Logit Model Prediction  ======================  Year Prediction Actual  ----------------------  1868 99.9 72.5  1872 100 82  1876 16 49.7  1880 37.6 57.7  1884 31.2 45.4  1888 44.4 58.1  1892 11.5 39  1896 99.7 61.1  1900 97.5 65.3  1904 100 72.1  1908 99.9 67.7  1912 0 4.3  1916 8.3 48  1920 100 76.1  1924 100 74.4  1928 100 83.6  1932 0 11.1  1936 0 1.5  1940 0.4 15.4  1944 1.1 18.6  1948 0.5 37.7  1952 100 83.2  1956 100 86.1  1960 81.6 41  1964 0 9.7  1968 97.8 59.5  1972 100 96.8  1976 32.5 44.8  1980 100 90.9  1984 100 97.6  1988 100 79.2  1992 0.3 31.2  1996 0 29.6  2000 58.9 50.4  2004 92.7 53.2  2008 2.7 32.3  2012 48.4 38.3  2016 37.3 56.7  ---------------------- |

**The model preforms especially well, mispredicting just the 1880 and 1960 elections when using the ±3% competitive definition, and 1880, 1888, 1960, and 2016 elections when using the ±5% definition. These incorrect predictions, however, are not simple mispredictions but instead have an associated probability of going to the Republican candidate, and in all four election years the probabilities are closer to 50% than they are to certainty for either party. Figure A1 shows the predicted logit plot.**

**Figure A1: Logit model Predictions for ±5%/Users/jcervas/Dropbox/Non Competitive Electors/logit5percent.pdf**

*Note: The year points represent which party won the election in the year. Those at the top are Republican victories, while those at the bottom are Democratic victories.*

**Table 1: Electoral College Data 1868-2016**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | Non Competitive  EC Seats | | |  | | --- | | Electoral College | | |  |  | | --- | --- | | Seats | Percent | | | | | | Differences | |
|  | Rep | Dem | Rep | Dem | Rep | Dem | Seats | Percent |
| 1868 | 153 | 37 | 211 | 80 | 0.725 | 0.275 | 116 | 0.399 |
| 1872 | 269 | 34 | 300 | 66 | 0.82 | 0.18 | 235 | 0.642 |
| 1876 | 64 | 119 | 182 | 184 | 0.497 | 0.503 | -55 | -0.15 |
| 1880 | 95 | 125 | 213 | 156 | 0.577 | 0.423 | -30 | -0.081 |
| 1884 | 93 | 123 | 182 | 219 | 0.454 | 0.546 | -30 | -0.075 |
| 1888 | 112 | 100 | 233 | 168 | 0.581 | 0.419 | 12 | 0.03 |
| 1892 | 112 | 150 | 173 | 271 | 0.39 | 0.61 | -38 | -0.086 |
| 1896 | 203 | 126 | 273 | 174 | 0.611 | 0.389 | 77 | 0.172 |
| 1900 | 258 | 122 | 292 | 155 | 0.653 | 0.347 | 136 | 0.304 |
| 1904 | 317 | 120 | 343 | 133 | 0.721 | 0.279 | 197 | 0.414 |
| 1908 | 283 | 120 | 327 | 156 | 0.677 | 0.323 | 163 | 0.337 |
| 1912 | 8 | 467 | 23 | 508 | 0.043 | 0.957 | -459 | -0.864 |
| 1916 | 171 | 213 | 255 | 276 | 0.48 | 0.52 | -42 | -0.079 |
| 1920 | 382 | 114 | 404 | 127 | 0.761 | 0.239 | 268 | 0.505 |
| 1924 | 366 | 136 | 395 | 136 | 0.744 | 0.256 | 230 | 0.433 |
| 1928 | 379 | 52 | 444 | 87 | 0.836 | 0.164 | 327 | 0.616 |
| 1932 | 8 | 413 | 59 | 472 | 0.111 | 0.889 | -405 | -0.763 |
| 1936 | 8 | 519 | 8 | 523 | 0.015 | 0.985 | -511 | -0.962 |
| 1940 | 27 | 290 | 82 | 449 | 0.154 | 0.846 | -263 | -0.495 |
| 1944 | 31 | 215 | 99 | 432 | 0.186 | 0.814 | -184 | -0.347 |
| 1948 | 37 | 215 | 200 | 331 | 0.377 | 0.623 | -178 | -0.335 |
| 1952 | 379 | 53 | 442 | 89 | 0.832 | 0.168 | 326 | 0.614 |
| 1956 | 446 | 47 | 457 | 74 | 0.861 | 0.139 | 399 | 0.751 |
| 1960 | 132 | 86 | 220 | 317 | 0.41 | 0.59 | 46 | 0.086 |
| 1964 | 47 | 463 | 52 | 486 | 0.097 | 0.903 | -416 | -0.773 |
| 1968 | 175 | 94 | 320 | 218 | 0.595 | 0.405 | 81 | 0.151 |
| 1972 | 511 | 17 | 521 | 17 | 0.968 | 0.032 | 494 | 0.918 |
| 1976 | 66 | 114 | 241 | 297 | 0.448 | 0.552 | -48 | -0.089 |
| 1980 | 344 | 19 | 489 | 49 | 0.909 | 0.091 | 325 | 0.604 |
| 1984 | 498 | 3 | 525 | 13 | 0.976 | 0.024 | 495 | 0.92 |
| 1988 | 289 | 42 | 426 | 112 | 0.792 | 0.208 | 247 | 0.459 |
| 1992 | 73 | 263 | 168 | 370 | 0.312 | 0.688 | -190 | -0.353 |
| 1996 | 66 | 348 | 159 | 379 | 0.296 | 0.704 | -282 | -0.524 |
| 2000 | 189 | 171 | 271 | 267 | 0.504 | 0.496 | 18 | 0.033 |
| 2004 | 213 | 183 | 286 | 252 | 0.532 | 0.468 | 30 | 0.056 |
| 2008 | 145 | 291 | 174 | 364 | 0.323 | 0.677 | -146 | -0.271 |
| 2012 | 191 | 233 | 206 | 332 | 0.383 | 0.617 | -42 | -0.078 |
| 2016 | 188 | 187 | 305 | 233 | 0.567 | 0.433 | 1 | 0.002 |

**Table 2:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Winningness | | Vulnerability | | Fragility | | Actual EC Outcomes |
|  | Democratic | Republican | Democratic | Republican | Democratic | Republican | actual |
| 1868 | 1 | 0 | 0 |  | 0 |  | 0.725 |
| 1872 | 1 | 0 | 0 |  | 0 |  | 0.82 |
| 1876 | 0.191 | 0.809 | 0.917 | 0.446 | 4.554 | 1.097 | 0.497 |
| 1880 | 0.308 | 0.692 | 0.881 | 0.611 | 3.061 | 1.365 | 0.577 |
| 1884 | 0.315 | 0.685 | 0.862 | 0.569 | 3.519 | 1.62 | 0.454 |
| 1888 | 0.575 | 0.425 | 0.667 | 0.785 | 2.144 | 2.905 | 0.581 |
| 1892 | 0.27 | 0.73 | 0.895 | 0.534 | 4.005 | 1.499 | 0.39 |
| 1896 | 0.979 | 0.021 | 0.095 | 1 | 0.159 | 7.419 | 0.611 |
| 1900 | 1 | 0 | 0 |  | 0 |  | 0.653 |
| 1904 | 1 | 0 | 0 |  | 0 |  | 0.721 |
| 1908 | 1 | 0 | 0 |  | 0 |  | 0.677 |
| 1912 | 0 | 1 |  | 0 |  | 0 | 0.043 |
| 1916 | 0.158 | 0.842 | 0.824 | 0.319 | 5.464 | 1.028 | 0.48 |
| 1920 | 1 | 0 | 0 |  | 0 |  | 0.761 |
| 1924 | 1 | 0 | 0 |  | 0 |  | 0.744 |
| 1928 | 1 | 0 | 0 |  | 0 |  | 0.836 |
| 1932 | 0 | 1 |  | 0 |  | 0 | 0.111 |
| 1936 | 0 | 1 |  | 0 |  | 0 | 0.015 |
| 1940 | 0 | 1 |  | 0 |  | 0 | 0.154 |
| 1944 | 0.009 | 0.991 | 1 | 0.05 | 9.85 | 0.093 | 0.186 |
| 1948 | 0.012 | 0.988 | 1 | 0.067 | 9.146 | 0.115 | 0.377 |
| 1952 | 1 | 0 | 0 |  | 0 |  | 0.832 |
| 1956 | 1 | 0 | 0 |  | 0 |  | 0.861 |
| 1960 | 0.699 | 0.301 | 0.496 | 0.799 | 1.861 | 4.325 | 0.41 |
| 1964 | 0 | 1 |  | 0 |  | 0 | 0.097 |
| 1968 | 0.824 | 0.176 | 0.383 | 0.874 | 1.053 | 4.848 | 0.595 |
| 1972 | 1 | 0 | 0 |  | 0 |  | 0.968 |
| 1976 | 0.306 | 0.694 | 0.775 | 0.494 | 4.714 | 2.092 | 0.448 |
| 1980 | 1 | 0 | 0 |  | 0 |  | 0.909 |
| 1984 | 1 | 0 | 0 |  | 0 |  | 0.976 |
| 1988 | 1 | 0 | 0 |  | 0 |  | 0.792 |
| 1992 | 0.00004 | 1 | 1 | 0.001 | 15.333 | 0.001 | 0.312 |
| 1996 | 0 | 1 |  | 0 |  | 0 | 0.296 |
| 2000 | 0.631 | 0.369 | 0.549 | 0.727 | 2.198 | 3.724 | 0.504 |
| 2004 | 0.725 | 0.275 | 0.52 | 0.854 | 1.45 | 3.773 | 0.532 |
| 2008 | 0 | 1 |  | 0 |  | 0 | 0.323 |
| 2012 | 0.191 | 0.809 | 0.939 | 0.449 | 3.592 | 0.85 | 0.383 |
| 2016 | 0.507 | 0.493 | 0.694 | 0.703 | 2.638 | 2.711 | 0.567 |

**Table 3: Correlations among the *Winningness*, *Vulnerability*, and *Fragility* variables for the Republican and Democratic Parties and with Republican EC seat share: 1868-2016**

|  |
| --- |
| **All pairwise observations** |
| Democratic Correlations  =====================================================================  winningness vulnerability fragility EC Outcome (DEM)  ---------------------------------------------------------------------  winningness 1 -0.957 -0.981 0.901  vulnerability -0.957 1 0.910 -0.855  fragility -0.981 0.910 1 -0.718  EC Outcome (DEM) 0.901 -0.855 -0.718 1  ---------------------------------------------------------------------  Republican Correlations  =====================================================================  winningness vulnerability fragility EC Outcome (REP)  ---------------------------------------------------------------------  winningness 1 -0.978 -0.876 0.901  vulnerability -0.978 1 0.804 -0.883  fragility -0.876 0.804 1 -0.774  EC Outcome (REP) 0.901 -0.883 -0.774 1  --------------------------------------------------------------------- |
| Democratic Correlations [Restricted Model]  =====================================================================  winningness vulnerability fragility EC Outcome (DEM)  ---------------------------------------------------------------------  winningness 1 -0.947 -0.973 0.726  vulnerability -0.947 1 0.886 -0.807  fragility -0.973 0.886 1 -0.667  EC Outcome (DEM) 0.726 -0.807 -0.667 1  ---------------------------------------------------------------------  Republican Correlations [Restricted Model]  =====================================================================  winningness vulnerability fragility EC Outcome (REP)  ---------------------------------------------------------------------  winningness 1 -0.964 -0.810 0.726  vulnerability -0.964 1 0.705 -0.658  fragility -0.810 0.705 1 -0.759  EC Outcome (REP) 0.726 -0.658 -0.759 1  --------------------------------------------------------------------- |

**Table 4: Regressions with *Non-Competitive Advantage* vs *Winningness* to Predict Final Republican EC seat share**

|  |
| --- |
| **Model 1 Model 2**  --------------------------------------------------  **Non Competitive Advantage** 0.530\*\*\*  (0.018)  **Winningness** 0.553\*\*\*  (0.044)  **Constant** 0.502\*\*\* 0.230\*\*\*  (0.009) (0.031)  N 38 38  Adj. R-squared 0.958 0.806  F Statistic (df = 1; 36) 840.011\*\*\* 154.927\*\*\*  --------------------------------------------------  \*\*\*p < .01; \*\*p < .05; \*p < .1  Note: All Regressions calculated using plus or minus 3% |

# References

Brams, Steven J. and D. Marc Kilgour. (2017). “Paths to victory in presidential elections: the setup power of noncompetitive states”. *Public Choice* 170:99–113,

Election 1984. (1984). *Editorial research reports 1984* (Vol. II). Washington, DC: CQ Press. Retrieved from http://library.cqpress.com/cqresearcher/cqresrre1984091400

Gelman, Andrew, and Gary King. (1993). “Why are American Presidential Election Campaign Polls so Variable When Votes are so Predictable?” *British Journal of Political Science*, Vol. 23, No. 1, pp. 409-451.

Shaw, Daron R. (1999). “The Methods behind the Madness: Presidential Electoral College Strategies, 1988-1996.” *The Journal of Politics*, 61(4), pp. 893–913.

Shaw, Daron R. (1999b). “The Effect of TV Ads and Candidate Appearances on Statewide Presidential Votes, 1988-96”. *The American Political Science Review*, 93(2), 345-361.

Shaw, Daron R. (2006). *The Race to 270.* Chicago: University of Chicago Press.

1. We will refer to Brams and Kilgour’s *Electoral Studies* paper by their names and with the B-K acronym interchangeably throughout this essay. [↑](#footnote-ref-1)
2. In 1984, Ronald Reagan won 49 out of 51 states (including Washington D.C.) Norman Ornstein, writing before the election, said “Incumbent presidents don’t often lose, particularly presidents presiding over 6% real growth and low or non-existent inflation” (quoted in CQ Press, http://library.cqpress.com/cqresearcher/document.php?id=cqresrre1984091400}). [↑](#footnote-ref-2)
3. In the process of replicating the Brams and Kilgour (2017) analyses, we found a few minor errors that we corrected; those corrections explain the differences in the numbers reported in Table 1 for the elections of 2000 and 2004**,** and those reported in Brams and Kilgour, Table 4. [↑](#footnote-ref-3)
4. Minor party candidacies likely to be a problem for our analyses in situations where they receive Electoral College votes. This has not been the case in recent elections, as no minor party candidate has won a state since George Wallace in 1968. In their assessment of minor party impact, Pattie and Johnson (2014) do not find substantial effects and they also note that such effects have often been split in their partisan impact. To provide a consistent coding across all elections in our data set we ignore minor party votes and treat contests as between the two major party candidates in terms of two party vote share. [↑](#footnote-ref-4)
5. In 1992, Bill Clinton was just 7 shy of having enough seats in non-competitive states, but could have lost the election in only 5 of the over 130,000 different combinations of electoral outcomes among the competitive states, ie Winningness >0.99. [↑](#footnote-ref-5)
6. While these two elections were very close in two-party vote margin, and thus might be regarded as hard to predict, they were less so electorally. In 1960, John F. Kennedy won the EC vote by 9.1% and in 1880, James Garfield won by 7.5%. In neither election were third party candidacies consequential in affecting relative two party shares. [↑](#footnote-ref-6)
7. When we include *Vulnerability*, and *Fragility,* we require separate equations for each party, and we lose cases. [↑](#footnote-ref-7)
8. If we restrict the model to *Winningness* scores greater than zero and less than one, the adjusted R2 drops to 0.52 (see Table 3). [↑](#footnote-ref-8)
9. http://www.stat.columbia.edu/~gelman/research/unpublished/pollposition\_v2.pdf When a state polls outside this three percentage point margin, it is generally seen as not winnable by the trailing candidate, although more errors in prediction do occur than would be suggested by the 95% confidence limits **(**Gelman and King 1993; Shirani-Mehr et al., forthcoming). [↑](#footnote-ref-9)
10. A third reason for choosing the ±3% value is a pragmatic one; over both recent elections and the longer historical data it has (marginally) greater predictive power than the often used ±5% definition of competitive state (see Appendix). [↑](#footnote-ref-10)
11. Data compiled from AdAge.com, based on state specific ad buys between October 21, 2016 and election day. http://adage.com/article/campaign-trail/states-where-trump-clinton-spending-most-on-advertising/306377/ [↑](#footnote-ref-11)
12. Data aggregated from FairVote.org, with original data from CNN: http://www.fairvote.org/presidential\_tracker\_2012#2012\_campaign\_events [↑](#footnote-ref-12)
13. **Bartels (1985) has pointing out that campaigns have instrumental and ornamental reasons for events. Attending an event in a swing state, where a candidate’s presence could increase turnout is instrumental while visiting a state to satisfy state parties might be ornamental.** Clinton spent over $600,000 in Arizona, perhaps trying to influence lower ticket races by increasing mobilization efforts. Ultimately, Arizona, a state that has had a strong Republican tradition, became competitive in 2016. [↑](#footnote-ref-13)
14. Detailed campaign activities for the 1976 election are available because they were submitted into evidence for the hearingbefore the Subcommittee on the Constitution of the Committee on the Judiciary (S.J. Res. 28,1979) on a bill that would abolish the ElectoralCollege and establish a direct popular vote. The data were first used by Bartels (1985). [↑](#footnote-ref-14)
15. We regard both of these assumptions as quite reasonable ones to make for purposes of model tractability, but we might expect that they would be falsified if there are electoral tides that sweep in a particular direction and thus create interdependencies in vote outcomes in the competitive states. [↑](#footnote-ref-15)
16. Using the plus or minus five percent definition of competitive, the *Non-Competitive Advantage* bivariate regression has an R2 of 0.93, while that of *Winningness* is 0.80. [↑](#footnote-ref-16)
17. Even when we do not include years when the election victories were so large that competitive states were irrelevant to the outcome, we still find a substantial correlation between the *Winningness* and *Non-Competitive Advantage* variables and the actual EC outcomes (an R2 of 0.50 vs. one of 0.60). [↑](#footnote-ref-17)
18. Using the plus or minus five percent classification, *Non-Competitive Advantage* accurately predicts 33/38 elections, while *Winningness* incorrectly predicts at least 4 elections. We were unable to provide *Winningness* calculations for a plus or minus five percentage point definition of competitive seat for the years of 1960 (a year that *Non-Competitive Advantage* incorrectly predict) and 1976, due to computational difficulties in calculating 231 coalitions.Using the plus or minus five percent classification, we conclude that *Winningness* can correctly classify between 32 and 34 of the 38 elections. [↑](#footnote-ref-18)
19. McCain wins 22 of the coalitions out of 32,768 using ±5%, a percentage low enough to round to zero. [↑](#footnote-ref-19)
20. Few would, at the time, have believed that the outcome was certain. McCain did not; he raised and spent over $300 million dollars in his quest for the presidency, though considerably outspent by Obama**.** McCain raised $368 million to Obama’s $730 million, http://www.opensecrets.org/pres08/ [↑](#footnote-ref-20)
21. Since we decreased the number of non-competitive states in 2008 by changing the definition, we have also increased the number of competitive ones, from 102 to 159. [↑](#footnote-ref-21)
22. Hillary Clinton won the popular vote by over 3 million votes, but still lost the Electoral College. [↑](#footnote-ref-22)