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Measuring the Strategic Value of States in the U.S. Electoral College

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Abstract

The United States' Electoral College (EC) system continues to raise questions about how much influence each citizen and state holds in presidential elections. Traditional power indices, such as the Banzhaf and Shapley-Shubik power indices, quantify state influence through weighted voting games, focusing on how coalitions of states can reach the 270-vote threshold. While informative, these measures overlook a key factor, i.e., the competitiveness of the two-party vote within each state. Wright (2009) addressed this by combining EC weight and competitiveness in a retrospective, rank-based model that identifies the state most likely to have been decisive in past elections. This article builds on that work by (1) introducing a simpler, transparent measure, strategic value, defined as the product of a state's EC seat share and its competitiveness, and (2) evaluating the prospective predictive validity of this measure for campaign visits, in contrast to Wright's retrospective ranking. Using lagged presidential election inputs (2012→2016; 2016→2020), strategic value positively predicts subsequent candidate visits in OLS models, with results robust to a negative binomial specification appropriate for over-dispersed counts. While these results are limited to the elections studied, strategic value performs more consistently than traditional indices, suggesting it offers a practical and accessible framework for evaluating state-level importance and, with caution, anticipating campaign strategy.

Keywords: Electoral College, strategic value, electoral competitiveness, public choice.

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Introduction

Every four years, millions of Americans gather around their preferred news sources, anxiously awaiting the announcement of election results. Although states like California and New York hold the most Electoral College (EC) votes, national attention often narrows to a handful of pivotal states, i.e., those that can tip the outcome and help a candidate reach the 270-vote threshold. In the "war" of politics, candidates fight the decisive "battles" in these so-called "battleground states." Also referred to as "swing states" or "purple states," these regions capture attention precisely because their outcomes are uncertain and consequential, making them central to the outcome of presidential elections.

Presidential candidates are just as focused on these states as the electorate. Despite often relatively few EC votes to offer, pivotal states play an outsized role in shaping campaign strategies and consistently receive a disproportionate share of resources, including time and money. At first glance, it may seem logical to assume that states with the most EC votes wield the most power. However, time and again, smaller states with fewer EC votes have determined the winner of presidential elections. For example, in 2000, Al Gore's loss in Florida, a state decided by only 537 votes, ultimately cost him the presidency despite his national popular vote lead. Florida's razor-thin margin underscores the critical role of battleground states in deciding elections and highlights the importance of understanding what makes these states strategically valuable.

This raises a critical question: what makes a state pivotal and thus strategically valuable? Is it the number of EC votes a state holds, or is it the level of competitiveness between candidates in that state? In this article, I argue that these two characteristics, Electoral College weight and competitiveness, are deeply intertwined and essential to understanding the strategic value of each state. In this study, I define a state's strategic value as the extent to which it can shift the outcome of a presidential election, either due to its EC weight or the closeness of the vote within it. This usage adapts a formal voting theory concept to capture practical campaign relevance.

Wright (2009) offers an important precedent in modeling state-level influence by analyzing past elections to identify which states were decisive in securing an Electoral College majority. His rank-based method highlights the role of competitiveness in determining the "pivot" state in historical outcomes. However, Wright's model does not explicitly distinguish between competitiveness and EC weight as separable, interacting dimensions. That is, although his historical ranking process incorporates both factors, it does not measure or combine them in a way that enables independent or predictive modeling.

Building on this idea, I offer a new approach that conceptualizes strategic value as a multiplicative interaction between competitiveness and weight, consequently yielding a simple, forward-looking measure of strategic state importance. In this study, I define competitiveness as closeness to parity in the two-party vote: specifically, 0.50 minus the absolute deviation of a state's two-party Democratic share from 0.50, thus larger values mean a tighter contest (0.50 at a 50–50 tie, approaching 0 as races become lopsided). By combining these characteristics into a single measure, I aim to develop a more accurate and predictive model of a state's strategic value than those offered by existing approaches.

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Background

For decades, game theory has provided political scientists with methods to calculate weighted games, such as the U.S. Electoral College system. Many of these models aim to identify the pivotal players of a game given a quota and the possibility of coalitions between players. The Electoral College's distinctive design, where states carry unequal weights, with some commanding 54 votes and others only 3, establishes a structure inherently suited to analysis through weighted majority games. Scholars commonly employ power indices like the Shapley-Shubik and Banzhaf indices to assess voting power in such settings. However, these measures fail to fully account for the quantitative competitiveness of individual states or the real-world dynamics of presidential campaigns.

Traditional power indices

The Shapley-Shubik power index, introduced by Lloyd Shapley and Martin Shubik in 1954, evaluates a player's potential to be pivotal in achieving a winning coalition within a voting system (Shapley & Shubik, 1954). In the context of the U.S. Electoral College, this index suggests that states with larger electoral vote counts may possess greater influence, as their support can be crucial in reaching the required 270 electoral votes for a presidential candidate to secure victory. The Shapley-Shubik index calculates the probability that a state will be the pivotal member in all possible sequential coalitions, effectively turning a losing coalition into a winning one.

Let us consider a simplified scenario with four states: Pennsylvania (19 electoral votes, P), California (54 votes, C), Illinois (19 votes, I), and Georgia (16 votes, G). The total electoral votes amount to 108, with a majority threshold of 55 votes needed for a coalition to win. In this setup, the Shapley-Shubik index examines all possible sequences in which these states can join a coalition and identifies the pivotal state, namely the one that, upon joining, causes the coalition's total to meet or exceed the 55-vote threshold. By analyzing all 4! = 24 permutations, the index determines the frequency with which each state is pivotal. For instance, if California frequently occupies the pivotal position across various sequences, it would receive a higher Shapley-Shubik power index, indicating significant influence in this voting system.

To better understand voting power in this scenario, let us consider the 24 possible permutations in which states can join a coalition: P–C–I–G, P–I–G–C, C–G–I–P, and so on. In the sequence P–I–G–C, Pennsylvania adds 19 votes, Illinois adds another 19 (totaling 38), and Georgia adds 16 (bringing the total to 54). At this point, the coalition is still just short of the 55-vote threshold. When California joins next with 54 votes, the coalition total rises to 108, surpassing the majority requirement. Therefore, California is pivotal for that sequence. By identifying the pivotal state in each of the 24 permutations, we find that California is pivotal in 18 of them, while Pennsylvania, Illinois, and Georgia are each pivotal in 2. This means that the Shapley-Shubik voting power of each state, equal to the proportion of cases when the state is pivotal, is as follows: C = 3/4, P = 1/12, I = 1/12, and G = 1/12.

In 1965, John F. Banzhaf III introduced the Banzhaf power index as an alternative measure of voting power (Banzhaf, 1965). Unlike the Shapley-Shubik index, which considers permutations, the Banzhaf index focuses on all possible subsets of players and identifies critical players, i.e., those whose participation is essential for a coalition to achieve a winning status. The Banzhaf index calculates the proportion of times a player is critical across all winning coalitions, providing a measure of a player's power within the voting system.

Using the same four-state example, the index evaluates all possible subsets of the states by taking one state at a time and examining every coalition it belongs to. For each coalition, we ask whether the coalition is winning with the state included but would fall below the threshold if the state were removed. If so, we consider the state critical to that coalition. For example, starting with Pennsylvania, consider the coalition of Pennsylvania and California. Together they hold 73 votes, which is above the 55-vote threshold. If Pennsylvania is removed, the coalition falls to 54, which is no longer winning. This means Pennsylvania is critical in this coalition. By assessing all such combinations, the Banzhaf index equals the proportion of how often Pennsylvania's involvement is essential for a coalition's success. If Pennsylvania is frequently a critical member in various coalitions, it would receive a higher Banzhaf power index, reflecting its substantial influence in the voting system. In this example, California is critical in seven coalitions, while Pennsylvania, Illinois, and Georgia are each critical in one. As a result, the Banzhaf index values are: C = 7/10, P = 1/10, I = 1/10, and G = 1/10. In this example, the Banzhaf and Shapley-Shubik indices return different values, demonstrating how the index choice can meaningfully alter the interpretation of voting power.

While both indices offer valuable insights into the distribution of power within voting systems, they do not account for individual states' competitiveness. In the context of the Electoral College, a state's influence arises not only from its electoral vote count but also from the degree to which it remains contested and competitive during elections. Traditional power indices like Shapley-Shubik and Banzhaf treat states as homogeneous entities, overlooking factors such as voter behavior, historical voting patterns, and demographic shifts that contribute to a state's competitiveness. This limitation suggests the need for more nuanced models that incorporate both the quantitative weight of electoral votes and measurable levels of competitiveness to accurately assess a state's strategic value in presidential elections.

Wright's rank-based system of pivotality

Wright's (2009) rank-based system of pivotality provides an alternative framework for identifying pivotal states by analyzing actual Electoral College outcomes across U.S. presidential elections. Unlike traditional power indices such as Shapley-Shubik or Banzhaf, which assume random coalition formation, Wright's model anchors its analysis in observed vote margins and Electoral College totals, reconstructing the practical pathways through which presidential victories were achieved. The Shapley-Shubik index evaluates a player's power by considering all possible sequential permutations of players joining a coalition, assuming that each order is equally likely. Similarly, the Banzhaf index measures power based on all possible coalitions, treating each coalition as equally probable. These assumptions simplify calculations but diverge from real-world voting patterns, where historical and contextual factors influence coalitions. Unlike these abstract models, Wright uses actual vote margins and Electoral College outcomes to empirically reconstruct the coalition that delivered victory. His method ranks states based on the size of their two-party vote share for the winning candidate and identifies the "pivotal" state as the one that pushes the cumulative Electoral College total above 270 votes (Wright, 2009).

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The mechanics of Wright's system involve three key steps (Wright, 2009). First, the system ranks states in descending order based on the winning candidate's two-party vote share. Second, it sequentially adds states to a coalition until it reaches the Electoral College threshold of 270. Finally, it identifies the pivotal state as the one whose electoral votes push the coalition over the threshold. For example, in the 2020 presidential election, Joe Biden secured 306 Electoral College votes. When ordering states by their two-party vote share and summing their electoral votes, Wisconsin's 10 votes were the tipping point that pushed him past the 270-vote threshold. Under Wright's model, this makes Wisconsin the pivotal state, as it completed the coalition necessary for Electoral College victory[2] (Wright, 2009).

Scholars have noted some limitations of Wright's model, particularly in its retrospective focus and lack of adaptability to dynamic campaign strategies. The model evaluates past outcomes based on actual vote shares and Electoral College results, providing a deterministic rather than probabilistic perspective. While this retrospective structure gives Wright's model strong descriptive power, it does not account for the uncertainties and fluidity of modern campaigns. Shaw, Althaus, and Panagopoulos (2024) emphasize that modern campaigns operate in a context of strategic flexibility, where state targeting is responsive to shifting polls, voter behavior, and resource constraints. For instance, the Reagan campaign in 1980 classified certain states, such as North Carolina and Mississippi, as "lean Democratic" but still prioritized them as potential battlegrounds based on shifting electoral conditions (Shaw et al., 2024). This nuance highlights the need for a more flexible model that accounts for real-time adjustments.

Another critique that one may raise about rank-based models like Wright's is that they may appear to underemphasize Electoral College vote weight in campaign strategy. While Wright's method does account for each state's electoral vote total, since the pivotal state is the one whose votes push the coalition over 270, it identifies only a single pivotal state per election, potentially obscuring the broader influence of larger states in campaign planning. For instance, although Pennsylvania's 20 electoral votes may not always make it the formal pivot under Wright's model, it often receives more strategic importance than smaller but similarly competitive states like Wisconsin. Likewise, states can be pivotal even when uncompetitive. For example, in the 2020 election, Florida was not among the most competitive states as Trump won it by over 3 percentage points, but its 29 electoral votes made it a major focus of both campaigns throughout the cycle. Both campaigns poured substantial resources into the state, demonstrating how Electoral College weight alone can elevate a state's strategic value even when it is not a true toss-up.

Shaw, Althaus, and Panagopoulos (2024) also highlight how the rise of data-driven campaign tactics, such as micro-targeting, challenges retrospective models like Wright's, which are not intended to reflect how campaigns allocate resources in real time. Modern campaigns increasingly rely on granular voter data to identify persuadable individuals and tailor outreach within strategically important states (Shaw et al., 2024). These adaptive strategies, shaped by polling fluctuations and shifting turnout projections, illustrate a level of strategic flexibility that retrospective models cannot capture. While Wright's rank-based approach offers valuable

[2] Wright's (2009) model defines the pivotal state as the one whose electoral votes bring the winning candidate's total past 270, when states are ranked in descending order of the candidate's two-party vote share. In 2020, Biden's strongest support came from states like Vermont (67%) and Massachusetts (66%), while Wisconsin (50.6%) was the last state in the ranked order whose inclusion brought his electoral vote total from 263 to 273.

insight into the electoral significance of states after the fact, it does not aim to model campaign behavior or resource allocation across multiple competitive states. This motivates the development of models that better capture the predictive dimensions of pivotality and reflect how candidates navigate both structural (electoral vote) and situational (competitiveness, volatility) factors. Empirical indicators like candidate visits, ad spending, and voter engagement provide important tools for validating such models and deepening our understanding of strategic campaign behavior.

Campaign visits

Although an imperfect measure, campaign visits can serve as a tangible and empirical measure of state importance during presidential elections. With limited time and resources, candidates must prioritize states they perceive as most strategically valuable, using visits to engage with voters and signal strategic priorities. They reflect the dynamics of modern electoral strategies and help illuminate the real-world application of theoretical models like Wright's rank-based competitiveness system. Modern presidential campaigns leverage sophisticated voter data to allocate resources efficiently, making campaign visits a key part of their strategic arsenal. As Shaw, Althaus, and Panagopoulos (2024) emphasize, the era of micro-targeting has enabled campaigns to identify persuadable voters within pivotal states, tailoring their outreach to maximize impact (Shaw et al., 2024). Such visits can function as both symbolic signals and practical interventions, serving as both a tool for voter engagement and a signal of a state's strategic value.

The 2020 election provides compelling examples of how campaign visits reflect pivotality. President Joseph "Joe" Biden's campaign prioritized Georgia and Arizona, traditionally Republican strongholds, to capitalize on shifting demographics and increasing competitiveness. These efforts yielded narrow victories in both states, flipping them for the Democratic Party and ultimately securing Biden's Electoral College majority. Conversely, Hillary Clinton's failure to campaign in Wisconsin during the 2016 election illustrates the potential consequences of neglecting battleground states. Despite Wisconsin's history as a closely contested state, Clinton's absence allowed Donald Trump to secure a narrow victory, contributing to his Electoral College win. These examples underscore how campaign visits may mirror candidates' perceptions of state pivotality and their willingness to adapt strategies based on evolving electoral landscapes.

While campaign visits provide valuable insights into candidates' strategic priorities, they are not without limitations. One critique is that visits alone do not capture the full spectrum of campaign activities. Fundraising efforts, digital outreach, and media advertising often complement or even outweigh the influence of physical appearances. As digital strategies have grown in prominence, campaigns can now target voters more efficiently through online platforms, reducing the relative weight of traditional visits. Moreover, the number of campaign visits may not fully reflect a state's importance if other factors, such as fundraising potential or regional dynamics, play a larger role in a candidate's decision-making. For example, candidates may visit large, non-competitive states primarily for fundraising events rather than voter mobilization, thus complicating the interpretation of visit data as a direct measure of pivotality. Despite these imperfections, campaign visits remain a critical indicator of state importance and provide a valuable lens through which we may evaluate and validate models of state-level influence.

Methods

In this study, I investigated the relationship between U.S. Presidential candidates' campaign trails and which variables may be the most indicative in explaining which U.S. states are the most strategically valuable in Presidential elections. Specifically, I was interested in finding the best model to explain the importance of states during an election, represented by the number of times the two-party presidential candidates visit each state during the 2016 and 2020 presidential elections.

Hypotheses

I hypothesized that we may better represent a state's pivotality in future presidential elections with an interaction between a state's competitiveness and its electoral weight. Specifically, a multiplicative function of strategic value would jointly account for both the state's share of Electoral College votes and the probability that its outcome is decisive in comparison to more commonly looked at variables: population share, Shapley-Shubik score, Banzhaf score, and an operationalization of Wright's (2009) rank-based pivotality.

Data

To assess predictive power, I used lagged presidential election results, specifically, the election results from four years before each campaign year (e.g., 2012 data to predict 2016 visits, and 2016 data to predict 2020 visits) for each state (D.C. and U.S. territories excluded). This approach simulates what information campaign strategists could reasonably rely on in real-time. For campaign data, I accessed a dataset of dates and locations of campaigning events published by FairVote[3]. I used voting data published by the U.S. House of Representatives to find the Electoral College results per state and the number of votes for the two main party candidates per state. Lastly, I gathered population totals by state available through the U.S. Census Bureau's online database.

Variables

My dependent variable was the number of campaign events held per state by the Republican and Democratic Presidential and Vice-Presidential nominees for the 2016 and 2020 elections. The number of campaign visits held per state in 2020 by the Republican nominees (Donald Trump and Michael "Mike" Pence) and the Democratic candidates (Joseph Biden and Kamala Harris) was tracked between 8/28/2020 to the date of the election, 11/3/2020. The number of campaign visits held per state in 2016 by the Republican nominees (Donald Trump and Mike Pence) and the Democratic candidates (Hillary Clinton and Timothy "Tim" Kaine) was tracked between 7/25/2016 to the date of the election, 11/8/2016. For the 2020 election, a few events originally scheduled to be in person, or scheduled to be streamed from a specific state, were entirely virtual due to staff members' contact with COVID-19. I still counted these events in my data because they still identify the significance of the states to the candidates in their decision to schedule events at these locations.

[3] Campaign visit data can be found in the appendix.

I used the number of campaign visits as my dependent variable, as it provides a unique look into the importance of specific battleground states. The amount of time and resources spent by candidates in different states is representative of how important these states are to them in each given Presidential election. Because the amount of time candidates have is so limited, the locations they prioritize to visit are suggestive of which states are most pivotal. Another possible reason why candidates choose to host campaign events in certain states is due to fundraising. For example, Democratic Senator Tim Kaine visited California five times over the course of the tracked months. In recent years, California has consistently voted Democratic and is considered to be a Democratic stronghold, with practically no possibility of being a swing state during the 2016 election. However, the Clinton/Kaine campaign visited this state to capitalize on the fundraising opportunities offered by its large, Democratic-leaning population.

I also tested for population share, Shapley-Shubik index, Banzhaf index, rank, and strategic value, all lagged by one presidential election, as independent variables. I calculated these variables through a variety of means:

1. Population share: We calculate population share state by state and normalize it to a total 1.00. This provides insight into whether the number of citizens in a state is most representative of the power the state holds in Presidential elections. We calculate the population share as:

$$Population\ Share = \frac{population\ of\ state}{total\ U.S. population}$$

2. Shapley-Shubik power index*:* The Shapley-Shubik Power Index is based on all possible voter permutations, from which we analyze all the decisive positions for a voter *i* (Pajala, 2002). Then, we divide the sum of all the decisive positions by all possible orderings (voter permutations), giving voter *i's* share on all pivots (decisive positions). Formally, we calculate voter *i's* Shapley-Shubik as:

$$\phi_i = \sum_{S \subseteq N} \frac{(s-1)!\,(n-s)!}{n!} \left[v(S) - v(S \setminus \{i\})\right].$$

   in which each swing receives a weight of $(s\text{-}1)!(n\text{-}s)!/n!$. Assuming that S is non-empty, s is the number of players in S, and n is the total number of players. $v(S)$ is 1 if S is winning and 0 otherwise. We then obtained the power index value for i by adding up all the weights. To calculate the Shapley-Shubik Power Index most accurately, I used the Powerslave Mark II calculator offered by Meskanen and Kause from the University of Turku (Pajala, 2002).

3. Standardized Banzhaf power index: We obtain the standardized Banzhaf index value for voter *i* by dividing the sum of *i*'s swings (regarding all possible combinations) by the sum of all voters' swings (Pajala, 2002).
   Formally, we calculate voter *i's* standardized Banzhaf index as:

$$\overline{\beta_i} = \frac{\sum_{S \subseteq N} \left[v(S) - v(S \setminus \{i\})\right]}{\sum_{j \in N} \sum_{S \subseteq N} \left[v(S) - v(S \setminus \{j\})\right]}.$$

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To calculate the Standardized Banzhaf Power Index most accurately, I again used the Powerslave Mark II calculator.

4. Rank: I calculated the Pivot Rank of each state to determine its relative pivotalness in securing a majority (≥270) of Electoral College (EV) votes. The procedure followed Wright's method for ranking states by their marginal contribution to a winning coalition:

   1) Sorting by Vote Share: I ordered all states *descending* by the winning candidate's two-party vote share (e.g., 60% > 55% > 50%).
   2) Cumulative EV Summation: Beginning with the state having the highest vote share, I added Electoral Votes (EVs) iteratively to a running total until the cumulative EVs met or exceeded 270, the threshold for a national majority.
   3) Pivot Rank Assignment: I identified the pivot state as the state whose inclusion tipped the cumulative EV total past 270. I assigned this state a rank of 0. States added *before* the pivot (higher vote share) received negative ranks (e.g., −1, −2), indicating they were "safe" for the winner. States added *after* the pivot (lower vote share) received positive ranks (e.g., +1, +2), indicating they were "non-pivotal" for the majority.
   4) Absolute Pivot Rank: To quantify pivotalness, I took the absolute value of each state's pivot rank (abs(pivot_rank)), where lower absolute values indicate greater pivotalness (closer to the tipping point) and higher values indicate less pivotalness (further from the tipping point).
   5) Operationalizing: To convert Wright's ordinal rankings into a continuous variable for appropriate regression analysis, I standardized the rankings by calculating z-scores. This process transforms each state's rank into a measure of how far it is from the average rank, expressed in standard deviation units. Specifically, I subtracted the mean of all state rankings from each value and then divided by the standard deviation of the rankings. Using a continuous, standardized scale is important because regression models assume that differences between values are meaningful and consistent – an assumption not met by ordinal ranks, where the "distance" between, for example, rank 1 and rank 2 may not be the same as between rank 10 and rank 11. Standardizing ensures that the variable reflects proportional differences in pivot probability, facilitates meaningful comparison of effect sizes across variables measured on different scales, and prevents the model from implicitly treating ordinal positions as interval data. This makes the pivot rank both statistically appropriate for OLS and directly comparable to other predictors like Banzhaf or Shapley-Shubik scores.

5. Strategic Value: I operationalized the strategic value of each state as the product of its Electoral College seat share and its competitiveness. Formally, for each state *i* in year *t*, $\textit{Strategic Value}_{i,t+4} = \textit{EC Seat Share}_{i,t} \times \textit{Competitiveness}_{i,t}$, in which:
   a) Electoral College seat share is normalized for each state to total 1.00. This differs from population share because the proportion of the number of voters to Electoral College seats changes state by state, considering that every state is given two Elec-

toral College seats to represent the Senate, and in the Senate, every state has equal representation regardless of its population size. The formula for EC seat share is as follows:

$$EC\ Seat\ Share\ = \frac{\#\ of\ EC\ votes\ of\ state}{total\ \#\ of\ EC\ votes\ in\ the\ U.S.}$$

b) We calculate competitiveness so that higher values represent more competitive elections. First, we determine the Democratic two-party vote share. Next, we calculate the difference between this share and 50% – which represents an even split between Democratic and Republican votes. This difference shows how far the state's results are from perfect parity. The closer the difference is to zero, the more competitive the state. Finally, we subtract this difference from 50% (0.5), so that a perfectly even state receives the maximum competitiveness score of 0.5, and states with more lopsided results receive smaller values. For example, a state with a Democratic two-party vote share of 51% would have a competitiveness score of 0.5 – |0.51 – 0.5| = 0.49, reflecting a highly competitive race. The formula for competitiveness is as follows:

$$Competitiveness\ = 0.5 - \left| \frac{votes\ for\ Democratic\ candidate}{total\ votes\ for\ Democratic\ \&\ Republican\ candidates} - 0.5 \right|$$

This interaction term of strategic value captures both the relative electoral weight of the state and how closely contested it is, reflecting the combined dimensions that make a state a strategic priority for campaign visits. A higher strategic value indicates a state that is both significant in the Electoral College and highly competitive, while a lower value indicates a state that is either small, uncompetitive, or both. This measure is part of all subsequent analyses, and I hypothesize it to be the most accurate predictor of candidate campaign visits.

Table 1 summarizes the distribution of the state-level characteristics used in the analysis for the 2012 election to test the 2016 visits. Table 2 provides the same for 2016 testing 2020 visits.

TABLE 1. Summary statistics for 2012 testing, including 2016 Visit data

	Visits	Population Share	Shapley-Shubik	Banzhaf	Rank	EC Seat Share	Competitiveness	Strategic Value
Mean	7.98	0.02	0.02	0.02	0.01	0.02	0.41	0.01
Median	1	0.01	0.01	0.01	-0.2	0.01	0.42	0.01
Std. Deviation	16.28	0.02	0.02	0.02	1.02	0.02	0.06	0.01
Minimum	0	0	0.01	0.01	-1.57	0.01	0.25	0
Maximum	71	0.12	0.11	0.11	1.59	0.1	0.5	0.04

Source: own elaboration.

TABLE 2. Summary statistics for 2016 testing, including 2020 visit data

	Visits	Population Share	Shapley-Shubik	Banzhaf	Rank	EC Seat Share	Competitiveness	Strategic Value
Mean	4.24	0.02	0.02	0.02	0.01	0.02	0.41	0.01
Median	0	0.01	0.01	0.01	-0.14	0.01	0.41	0.01
Std. Deviation	9.38	0.02	0.02	0.02	1.02	0.02	0.07	0.01
Minimum	0	0	0.01	0.01	-1.55	0.01	0.24	0
Maximum	47	0.12	0.11	0.11	2.31	0.1	0.5	0.03

Source: own elaboration.

Testing

To assess the relationship between the proposed Strategic Value measure, other established predictors, and the distribution of presidential campaign visits, I ran two types of regression models. First, I employ ordinary least squares (OLS) regression to provide a baseline comparison consistent with prior work on campaign resource allocation (e.g., Shaw 2006). Second, I ran a Negative Binomial regression as a robustness check, given that the dependent variable, i.e., the number of candidate visits per state, is a count measure and may exhibit overdispersion. The Negative Binomial model relaxes the equidispersion assumption of the Poisson model and is preferred in cases where the variance exceeds the mean (Hilbe, 2011).

I conducted two sets of analyses for each model type:

1. Regression of 2016 Campaign Visits with 2012 Election Results: A regression analysis evaluated the influence of lagged variables like competitiveness and Electoral College weight on the number of campaign visits during the 2016 election. The test sought to identify the primary predictors of campaign visit distribution and whether the strategic value model is the best predictor.
2. Regression of 2020 Campaign Visits with 2016 Election Results: This regression analyzed the influence of lagged variables on the number of campaign visits during the 2020 election, identifying whether patterns observed in 2016 persist in the subsequent cycle.

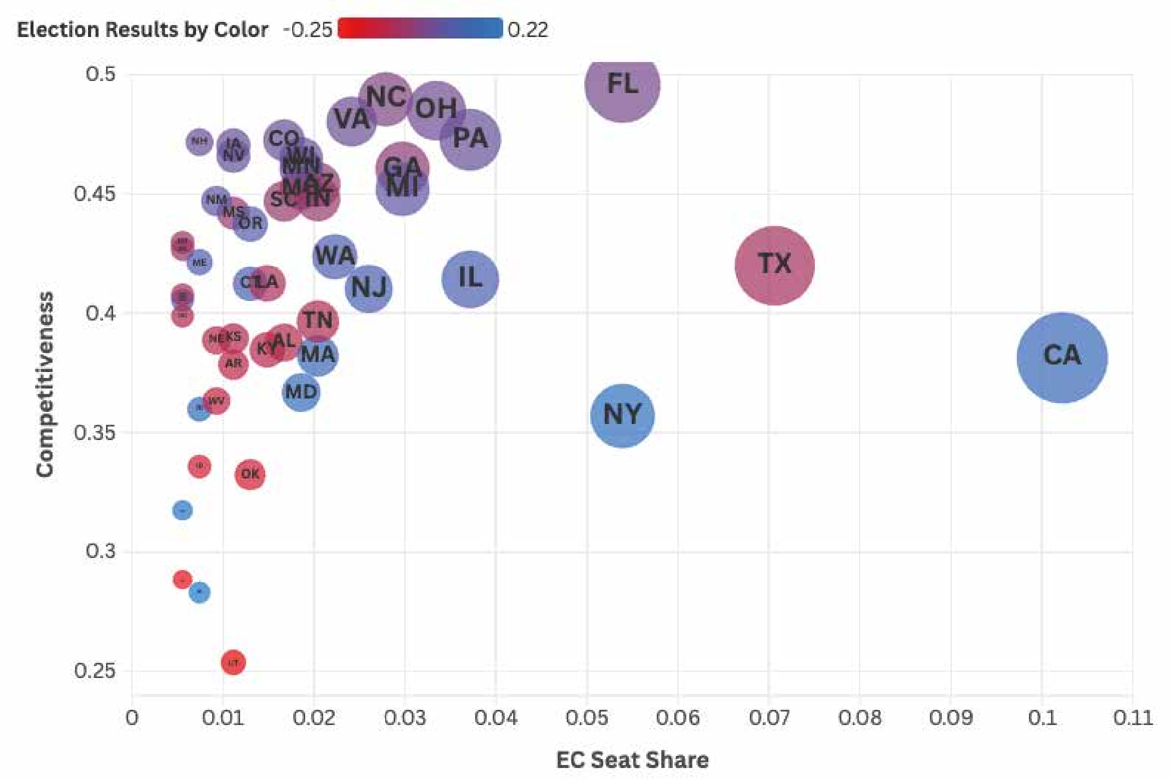
To aid interpretation and presentation, I also created Pareto diagrams of OLS standardized effects to visually rank the relative importance of predictors, and bubble charts to illustrate how Electoral College seat share and competitiveness interact to form strategic value.

Results

Visual orientation

To visualize how the combination of electoral weight and competitiveness shapes each state's strategic value, Figure 1 displays a bubble chart of all 50 states for the 2012 election, and Figure 2 does so for 2016. In these plots, a bubble positioned by its Electoral College seat share (x-axis) and competitiveness (y-axis) represents each state, with the size of each bubble reflecting the state's strategic value quotient (the product of EC seat share and competitiveness). Bubble color encodes the two-party vote: the bluer denotes Democratic-leaning states and the redder denotes Republican-leaning states, given their two-party vote shares. States that are competitive and electorally significant appear as larger bubbles. Figure 2 displays Maine and Nebraska at the state level.

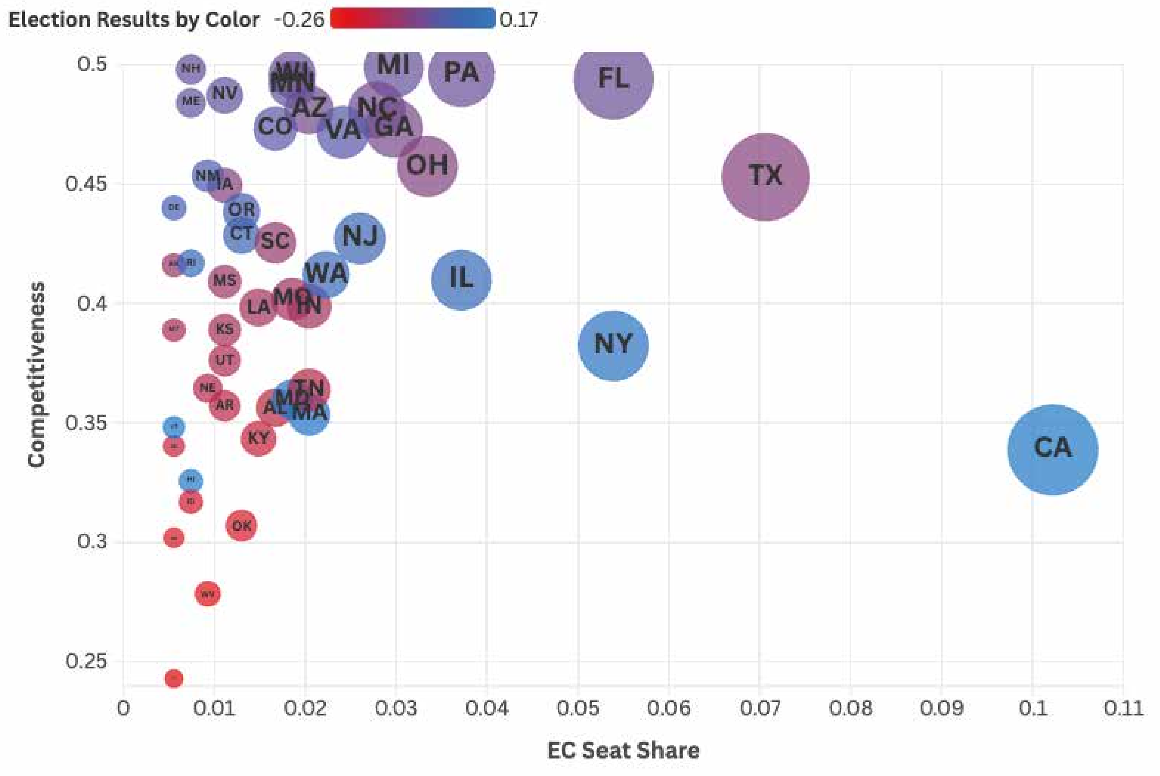
FIGURE 1. Strategic value of U.S. states in the 2012 presidential election



Source: own elaboration.

The pattern in Figure 1 reflects the joint effects of Electoral College apportionment and competitiveness. States near parity in the two-party vote (purple) generally display larger bubbles than strongly Democratic (blue) or Republican (red) states with comparable Electoral College weight. California and New York are visually prominent as structural outliers in EC seat share, by design within the strategic-value construct. Thus, their size reflects electoral weight more than competitiveness relative to Texas or Florida. Future work could test whether strategic value also predicts fundraising intensity (e.g., in-state receipts and geo-targeted digital solicitations), with the hypothesis that high-population donor bases (e.g., California, New York) attract disproportionate fundraising attention even when contests are less competitive.

FIGURE 2. Strategic value of U.S. states in the 2016 presidential election



Source: own elaboration.

Relative to 2012, we may see modest reordering as states move toward or away from parity in the two-party vote: bubbles expand where competitiveness rises and contract where it falls. The upper tier remains broadly similar, with the largest movement occurring among mid-tier states. For formal comparisons, see Tables 5–6.

Prediction results for 2016 Visits

TABLE 3. OLS regression of 2012 variables on 2016 presidential campaign visits

R	R^2	Adjusted R^2	Standard error of the estimate				
0.84	0.70	0.67	9.39				
	Unstandardized Coefficients	Standardized Coefficients				95% confidence interval for b	
Model	*B*	Beta (β)	Standard error	*t*	*p*	Lower bound	Upper bound
Constant	0.65		5.7	0.11	.909	-10.84	12.14
Population Share	397.83	0.54	1589.04	0.25	.803	-2804.68	3600.34
Shapley-Shubik	-8850.47	-10.39	5130.02	-1.73	.091	-19189.34	1488.41
Banzhaf	5248.75	6.21	3741.21	1.4	.168	-2291.16	12788.66
Rank	-3.42	-0.21	1.63	-2.11	.041	-6.7	-0.15
Strategic Value	**8481.25**	**3.93**	**1364.84**	**6.21**	**<.001**	**5730.6**	**11231.9**

Source: own elaboration.

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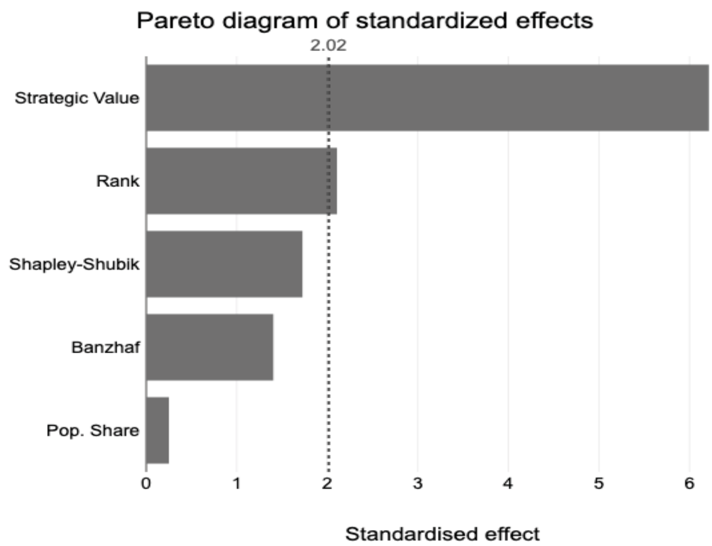
Using 2012 election results to predict the distribution of campaign visits in 2016, the OLS model in Table 3 explained 70% of the variance in visits ($R^2 = 0.70$, adjusted $R^2 = 0.67$). Strategic value was statistically significant ($b = 8{,}481.25$, $\beta = 3.93$, $p < .001$) and had the largest standardized coefficient among the significant predictors, indicating that, all else equal, states with higher strategic value received more candidate visits. Rank also reached statistical significance ($b = -3.42$, $\beta = -0.21$, $p = .041$), though the effect was smaller. The Shapley-Shubik ($\beta = -10.39$, $p = .091$) and Banzhaf ($\beta = 6.21$, $p = .168$) scores had larger absolute standardized coefficients than strategic value but were not statistically significant, meaning the data did not provide strong evidence that their observed effects differed from zero in this model. Furthermore, their coefficients varied in sign, which was consistent with the near-collinearity of Shapley–Shubik, Banzhaf, and population share, together with the limited number of states receiving visits in that cycle.

FIGURE 3. Pareto diagram of standardized effects for 2012 variables on 2016 presidential campaign visits



Source: own elaboration.

Figure 3's Pareto diagram illustrates standardized effect sizes, with the vertical reference line marking the 2.02 threshold (approximately $|t| \approx 2.02$ at $\alpha = .05$) beyond which we consider effects statistically significant in this context. The x-axis represents the standardized effect size, enabling direct comparison of variable influence. Figure 3 visually confirms that strategic value had the largest statistically robust effect, followed by Wright's rank-based system. The sizable but non-significant standardized effects for the Shapley–Shubik and Banzhaf scores indicated apparent influence that does not reach conventional thresholds of certainty.

TABLE 4. Robustness check: Negative binomial regression of 2012 variables on 2016 presidential campaign visits

Pseudo R^2 (CS)	Log- Likelihood	Pearson χ^2	Deviance			
0.9191	-93.995	56.6	36.950			
Model	**Coefficient (b)**	**Standard error**	**z**	**$P>\|z\|$**	**[0.025**	**0.975]**
Intercept	-1.1312	0.872	-1.297	0.194	-2.84	0.578
Population Share	-225.468	236.11	-0.955	0.34	-688.235	237.299
Shapley-Shubik	-1571.0986	971.528	-1.617	0.106	-3475.259	333.062
Banzhaf	1378.7632	784.849	1.757	0.079	-159.513	2917.04
Rank	-1.1719	0.288	-4.064	0.000	-1.737	-0.607
Strategic Value	**1157.1167**	**291.349**	**3.972**	**0.000**	**586.083**	**1728.15**

Source: own elaboration.

Table 4's robustness check using a Negative Binomial regression yields consistent conclusions with Table 3. Strategic value remains statistically significant (b = 1,157.12, $p < .001$) and positive in direction, and rank is again significant (b = −1.17, $p < .001$) but with a much smaller coefficient. The Shapley-Shubik and Banzhaf coefficients are similar in sign to the OLS estimates but remain statistically non-significant. This reinforces the previously suggested conclusion that strategic value is the most consistently reliable predictor across model specifications, even when using a count-data model appropriate for campaign visit data (Hilbe, 2011).

Prediction results for 2020 Visits

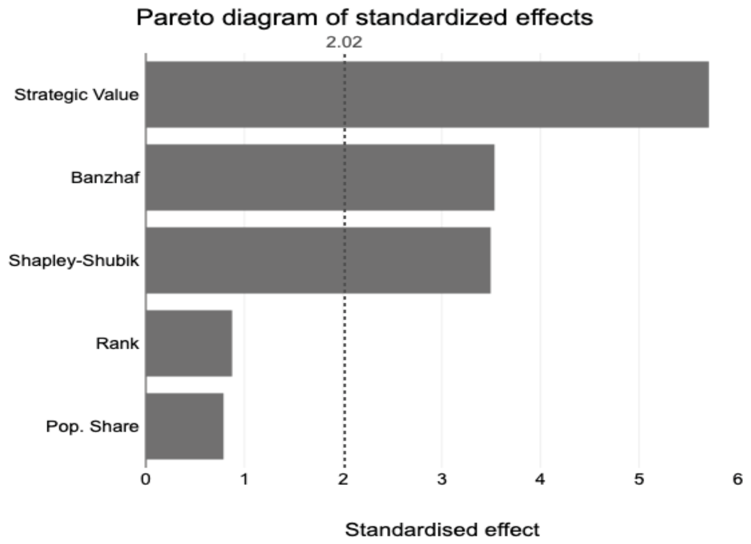
TABLE 5. OLS regression of 2016 variables on 2020 presidential campaign visits

R	R^2	Adjusted R^2	Standard error of the estimate				
0.80	0.64	0.59	5.97				
	Unstandardized Coefficients	Standardized Coefficients				95% confidence interval for b	
Model	**b**	**Beta (β)**	**Standard error**	**t**	**p**	**Lower bound**	**Upper bound**
Constant	0.58		3.51	0.17	.868	-6.49	7.66
Pop. Share	787.09	1.86	1000.01	0.79	.435	-1228.29	2802.48
Shapley-Shubik	-15939.44	-32.5	4561.79	-3.49	.001	-25133.12	-6745.77
Banzhaf	12705.55	26.12	3595.71	3.53	.001	5458.87	19952.22
Rank	1.10	0.12	1.26	0.87	.387	-1.44	3.64
Strategic Value	**6280.39**	**4.98**	**1100.77**	**5.71**	**<.001**	**4061.94**	**8498.84**

Source: own elaboration.

Using 2016 election results to predict campaign visits in 2020, the OLS model in Table 5 explained 64% of the variance (R^2 = 0.64, adjusted R^2 = 0.59). Strategic value was again statistically significant (b = 6,280.39, β = 4.98, $p < .001$) and had the largest standardized coefficient among the significant predictors. In this cycle, both the Shapley-Shubik (b = −15,939.44, β = −32.50, p = .001) and Banzhaf (b = 12,705.55, β = 26.12, p = .001) scores were also statistically significant with large magnitudes. However, these effects were in opposite directions, inflated compared to prior results, and inconsistent with 2016. These shifts in sign and significance were consistent with expectations under multicollinearity and small-N sensitivity, and may also reflect changes in campaign strategy, as visits concentrated in different states in 2016 versus 2020. Lastly, Wright's rank was not statistically significant in this model (p = .387), indicating less consistent predictive performance over time. Figure 4 also illustrates these findings.

FIGURE 4. Pareto diagram of standardized effects for 2016 variables on 2020 presidential campaign visits



Source: own elaboration.

Strategic value again stood out as a major predictor, but the appearance of large, significant coefficients for the Shapley–Shubik and Banzhaf scores in this cycle contrasted with their null findings in the previous one, raising questions about their stability as predictive tools. Strategic value also outperformed rank, suggesting the model may be an improvement to Wright's (2009) rank-based system for predictive measuring (with significance corresponding to |t| = 2.02 in this specification).

TABLE 6. Robustness check: Negative binomial regression of 2016 variables on 2020 presidential campaign visits

Pseudo R^2 (CS)	Log- Likelihood	Pearson χ^2	Deviance			
0.9136	-66.493	31.7	29.045			
Model	**Coefficient (b)**	**Standard error**	**z**	**P>|z|**	**[0.025**	**0.975]**
Intercept	-1.9905	1.411	-1.41	0.158	-4.757	0.775
Population Share	-0.4144	287.885	-0.001	0.999	-564.659	563.83
Shapley-Shubik	-2566.75	2437.374	-1.053	0.292	-7343.91	2210.418
Banzhaf	2099.488	2511.549	0.836	0.403	-2823.06	7022.032
Rank	-1.3802	0.648	-2.129	0.033	-2.651	-0.11
Strategic Value	**1232.13**	**433.847**	**2.84**	**0.005**	**381.805**	**2082.455**

Source: own elaboration.

The robustness check confirmed the central role of strategic value (b = 1,232.13, p = .005) and found Wright's rank significant (b = −1.38, p = .033). The Shapley-Shubik and Banzhaf scores were not significant in this specification, echoing the 2012–2016 pattern in Table 4.

Conclusions

The findings support the central hypothesis that combining Electoral College seat share and electoral competitiveness into a unified, multiplicative model – strategic value – may produce a more comprehensive and empirically robust measure of state-level pivotality than previous approaches. Traditional power indices such as the Shapley-Shubik and Banzhaf scores remain useful for understanding theoretical voting power distributions but do not consistently correlate with electoral competitiveness or reflect contemporary campaign behavior. Some of this year-to-year variation in the signs and significance of the Shapley–Shubik and Banzhaf indices likely reflects their very high correlation with state population, combined with the limited number of cases and concentration of visits, which makes coefficient instability across cycles expected. Wright's (2009) rank-based method continues to offer historical value in identifying decisive states retrospectively, but its ordinal nature limits its flexibility for predictive modeling or comparative evaluation across all states.

The strategic value measure developed in this study, defined as the product of a state's EC weight and its electoral competitiveness, not only performs strongly in regressions predicting campaign visits for the 2016 and 2020 elections, but also aligns intuitively with observed campaign strategies. Its consistent statistical significance across models suggests it may serve as a reliable forward-looking tool for assessing where candidates are most likely to allocate resources, while also offering two primary advantages over existing models. First, it provides an accessible, scalable method for evaluating the importance of all states, not just the single pivot state identified by Wright's (2009) ordinal approach. Neither does it require complex simulations. Second, it enables predictive modeling using lagged election data. While the current analysis uses prior presidential election results, one could adapt the measure to incorporate midterm vote share averages, aggregated polling data, or other indicators, depending on prediction horizons.

Importantly, the model is not restricted to prediction. It also provides a framework for reflecting on past elections in a more granular way, allowing researchers to ask not just "which state was decisive?" but "how important was each state, and why?" This broader perspective can improve explanations of campaign behavior, including cases where allocation decisions deviated from expectations, and highlights implications that extend beyond academic interest. States perceived as more pivotal may receive disproportionate political attention, extract policy concessions, and experience heightened civic engagement – or, conversely, suffer from neglect and voter disillusionment in less-targeted regions. By clarifying the measurable factors that influence campaign resource allocation, I hope to contribute to a more transparent understanding of presidential election strategy.

Limitations and future directions

The study used campaign visits as a proxy for candidate attention, which captures a key component of strategic behavior but does not fully account for alternative modes of engagement, such as targeted advertising, field organizing, or digital outreach. Moreover, travel constraints, incumbency advantages, and media ecosystems can influence visit patterns in ways not accounted for in this model. For example, geographic proximity to major media markets or primary states may skew results independently of strategic value. Future work could improve the model by incorporating these additional variables, as well as more dynamic measures such as real-time advertising expenditures, demographic targeting, or hybrid campaign mobilization strategies that blend digital and in-person tactics. Advancements in data availability, particularly geospatial and behavioral measures, could also enhance the model's responsiveness and relevance across different electoral contexts.

Despite these limitations, this study contributes to the understanding of presidential campaign strategy by proposing a model that appears empirically grounded, conceptually intuitive, and adaptable across electoral contexts. The strategic value measure links theoretical power indices with observable campaign behavior, offering a replicable and accessible framework for examining patterns of electoral influence. While further testing across additional election cycles and alternative measures of campaign engagement is warranted, the findings here suggest that this approach can serve as a useful tool for anticipating how, and where, competition for the presidency may emerge.

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APPENDIX

Campaign Visits*:* States with ≥1 campaign visit during the 2016 and 2020 U.S. presidential elections:

State	2016 Visits	2020 Visits	2012 & 2016 EC seat share	2012 Competitiveness	2016 Competitiveness
Arizona	10	13	0.0204461	0.4539	0.4811
California	1	0	0.10223048	0.3813	0.3387
Colorado	19	0	0.01672862	0.4725	0.4732
Connecticut	1	0	0.01301115	0.4123	0.4286
Florida	71	31	0.05390335	0.4956	0.4938
Georgia	3	7	0.02973978	0.4604	0.4734
Illinois	1	0	0.03717472	0.4142	0.4098
Indiana	2	1	0.0204461	0.4479	0.3988
Iowa	21	5	0.01115242	0.4704	0.4494
Maine	3	2	0.00743494	0.4214	0.484
Michigan	22	21	0.02973978	0.452	0.4988
Minnesota	2	9	0.01858736	0.4606	0.4917
Mississippi	1	0	0.01115242	0.442	0.4091
Missouri	2	0	0.01858736	0.4522	0.4018
Nebraska	2	1	0.00929368	0.3887	0.3645
Nevada	17	11	0.01115242	0.4659	0.4871
New Hampshire	21	4	0.00743494	0.4717	0.498
New Mexico	3	0	0.00929368	0.447	0.4535
North Carolina	55	25	0.02788104	0.4897	0.481
Ohio	48	13	0.03345725	0.4849	0.4573
Pennsylvania	54	47	0.03717472	0.4727	0.4962
Texas	1	3	0.07063197	0.4199	0.4529
Utah	1	0	0.01115242	0.2537	0.3762
Virginia	23	1	0.02416357	0.4803	0.4717
Washington	1	0	0.02230483	0.4237	0.4121
Wisconsin	14	18	0.01858736	0.4648	0.4959

Note. All other states (e.g., Alabama, Alaska, etc.) had zero visits in both years.

Source: own elaboration.