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Pivotal states in the Electoral College, 1880 to 2004

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Abstract This paper presents an empirical measure of pivoting in the electoral college from 1880 to 2004. The measure derives from established theoretical concepts of power and pivoting first introduced by Shapley and Shubik (Am. Political Sci. Rev. 84:787–792, 1954). Pivotal states identified by this approach generally conform to popular interpretations—Ohio in 2004, Florida in 2000, and so forth—but, historically, pivotal states are also frequently small or medium-sized states. Also, pivotal states by this approach are not necessarily competitive states. In general, whether or not a state is pivotal is mainly a function of its size and bellwether tendency—i.e., its tendency to mirror the national voting trend. A state's pivot position is also an excellent predictor of how presidential candidates allocated time and money across states in the general elections of 2000 and 2004. Controlling for a state's pivot position, size and electoral competitiveness have little effect on the allocation of campaign resources.

Keywords Electoral college · Presidential elections · Pivotal

1 Introduction

Whether to maintain or abolish the Electoral College is one of the enduring debates of American politics. A main argument against the College is that it violates the equality principle of "one person, one vote." In contrast to a system of direct popular election, the Electoral College discriminates—depending on the arguments used—against voters in small states, large states, or non-competitive states. Scholars disagree about which states are advantaged and disadvantaged largely because they employ different definitions and measures of power in presidential campaigns. If one equates power with electoral competition, for example, then competitive or "swing" states are advantaged; but if one associates power with size, then large states benefit from the Electoral College system.

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In this paper, I define powerful states as those that are pivotal in Electoral College voting, and I develop an empirical measure of pivoting that follows directly from the theoretical work of Shapley and Shubik (1954). For U.S. presidential elections from 1880 through 2004, I determine which state cast the deciding electoral votes when states join a candidate's coalition in the order of their popular vote shares, with the state providing the largest popular vote share for the winner being the first to join. The pivotal state in this sequence is the one whose electoral votes provide the majority required for victory.

A pivotal state in this context has a precise meaning. A pivotal state in the extant literature, in contrast, is often interpreted broadly to mean competitive states, swing states, or battleground states—generally states where candidates are presumed to allocate substantial campaign resources (e.g., Uslaner 1973; Johnson 2005). As defined and measured here, however, competitiveness and pivoting are theoretically and empirically distinct concepts, and electoral competitiveness is neither necessary nor sufficient for pivoting.

Previous applications of Shapley and Shubik (1954) to the Electoral College have not used candidates' within-state popular vote shares to approximate an order of voting. Mann and Shapley (1962) and Longley and Dana (1984, 1992), for example, assume that the order of voting among states in the Electoral College is entirely random, so that all coalitions of states are equally likely. Consequently, a coalition of Utah and Massachusetts is just as likely as a coalition of Utah and Montana. However, if instead of forming randomly, one assumes that coalitions form in the order of states' popular vote shares for the winning candidate, then a coalition of Utah and Massachusetts is highly unlikely. Given the current distribution of partisan preferences across states, only in the case of an extreme landslide would Utah and Massachusetts both join a winning candidate's coalition. The present analysis therefore yields quite different results from those that assume equally likely coalitions.

Among the empirical results that follow, Ohio was pivotal in 2004, Florida in 2000, California in 1916, New York in 1888, and so forth. These results are consistent with the conventional wisdom about these campaigns. In addition, pivotal states tend to be those whose vote shares for the winning candidate closely reflect the national vote share for the winning candidate. Consequently, pivotal states as measured here will not necessarily be large states nor competitive states, even though large states do have an advantage in being pivotal. Small and medium-size states often reflect national voting trends better than large states, and thus it turns out that small and medium-size states are pivotal in roughly one-fourth of the elections. Finally, the empirical analysis shows that a state's pivot position—where it ranks relative to the pivotal state—is a significant predictor of presidential candidates' media buys and travel decisions in the last two presidential elections.

The remainder of the paper proceeds in three parts. The next section reviews the various assumptions and approaches in the existing literature on the power of states in the Electoral College. The paper then discusses several implications of an alternative measure of state power and offers a proposition about the conditions under which the popular vote share between candidates in the pivotal state will exactly mirror the national vote share. The empirical analysis comes next. Pivotal states are identified for each of the elections from 1880 to 2004, and general properties of the empirical measure of pivoting are established.

2 The power of states in the Electoral College

There is no definitive answer to the question of which states, if any, are advantaged or disadvantaged by the Electoral College. Mann and Shapley (1962), Banzhaf (1965, 1968), Brams and Davis (1973, 1974), and Colantoni et al. (1975) have argued that there is a decided large-state advantage. This conclusion has been advanced by Longley (1975), Longley and Dana

(1984, 1992), and Longley and Pierce (1999). Smith and Squire (1986) also acknowledge a large-state advantage, and in a simulation of Electoral College voting, Rabinowitz and McDonald (1986) concluded that the large states of California, Texas, New York, Illinois, and Ohio were most powerful between 1948 and 1984. Recently, however, Gelman et al. (2004) conclude that the power indexes from which Banzhaf and others have drawn their conclusions are flawed and "do not work," and they demonstrate a less pronounced advantage for large states.

Other studies also temper the conclusion that large states always have an advantage. Uslaner (1973: 71) reported a large state bias in the Electoral College, but also noted that "large state power is hardly monolithic." Adkins and Kirwin (2002) analyzed the potential advantage of small states resulting from the "federalism bonus"—two electoral votes for every state regardless of size—and found that the bonus has been decisive in three presidential elections between 1856 and 2000. Patterson (2002: 139) has argued that the current system "works to the advantage of a mere handful of competitive states, which change from one election to the next," and Johnson (2005: 340) has shown that the size and identity of competitive states in presidential elections from 1824 through 2000 are "unpredictable," yielding neither a large nor a small state advantage.

These various works build from different assumptions and focus on different aspects of presidential campaigns. The large-state advantage reported by Mann and Shapley (1962) and Longley and Dana (1984, 1992), for example, is mainly a consequence of assuming that all coalitions of states are equally likely to form in the Electoral College. Given all possible random coalitions of states that could constitute a majority of Electoral College votes, large states, because they have a higher probability of casting the decisive vote, will more often be part of a winning coalition than small states.

Other studies focus on the allocation of candidates' campaign resources. From this perspective, Johnson (2005: 344), argues that competitiveness, not size is the relevant factor: "Whether the state is large or small, campaigns are interested in investing where they can compete." Similarly, Uslaner (1973: 65) argues that candidates should spend their resources in swing states, and that in "attempting to isolate 'pivotal' states, the focus should be on the probability that a state would shift its votes to the losing candidate." Uslaner assumes that "this probability is simply a function of the closeness of the election in the state."

Another vein of research represented by Penrose (1946), Good and Mayer (1975), Margolis (1977, 1983), Gelman et al. (1998), and Gelman et al. (2004) analyzes pivotal voters within *states* rather than pivotal states within the Electoral College. A central question in these analyses is whether the power of a single voter within a state is proportional to $\frac{1}{n}$ or to $\frac{1}{\sqrt{n}}$, where n is the population of the state. The implication of one or the other is important because the overall power of a single voter in a presidential election is a function of both the power of the voter within the state and the power of the state within the Electoral College.

I depart from these research traditions in several ways. First, I confine my analysis to the power of states within the Electoral College and do not address the debate about the power of individuals within states. Second, I adhere to a definition of pivotal states that has a precise meaning in the theoretical literature on coalition formation. And third, I use empirical election outcomes within states to establish an order of coalition formation instead of assuming that coalitions form randomly.

The seminal theoretical work for analyzing the power of states in the Electoral College, or for analyzing systems of weighted voting more generally, is Shapley (1953). Shapley proposed a method for evaluating n-person games that provided a unique prediction of the expected payoff to each player from joining a coalition. In Shapley's solution, the payoff, or what is known as the Shapley value, for each player is the expected marginal value that player adds to the total value of a coalition. Shapley's approach was an important innovation in the analysis of n-person games not only because it allowed players to assess *a priori* whether they stood to gain more by joining a coalition than by acting individually, but also because it provided a means of comparing the relative strengths of players.[1]

Shapley's approach was first applied to political coalition building by Shapley and Shubik (1954). Some key features and assumptions of this approach are that only winning coalitions have positive value—blocking or losing coalitions have no value—and coalitions larger than minimal winning gain no additional value by adding more members. In addition, players are assumed to join coalitions in any order, and all orders are equally likely. Under these assumptions, a player's power is a function of the number of possible coalitions in which the player is pivotal. A pivotal player in the Shapley-Shubik game is one who, upon joining a coalition, transforms it from non-winning to winning. To be pivotal, therefore, a player must be the last member added to a minimum winning coalition. Player i's Shapley-Shubik (SS) power value, or index, is defined as $\varphi_i = \frac{p_i}{k!}$, where $k!$ is the number of possible coalitions of k members, where each coalition is a distinct ordering of members, and where p_i is the number of coalitions in which i is pivotal.

Mann and Shapley (1960, 1962) first calculated φ for states in the Electoral College, where each state's weight was its number of electoral votes.[2] A state's power in the Electoral College, following the SS index, is the proportion of all possible coalitions in which the state is pivotal, where each possible coalition is a particular random ordering of states. Since the Shapley-Shubik index provides a measure of the relative strengths of all players in the game, Mann and Shapley were able to rank-order states according to their power in the Electoral College. Their analysis revealed a slight bias in favor of large states. They determined that a state's power in the Electoral College is just slightly larger than its share of total electoral votes. The value of φ for the largest state (New York), for example, was 0.084064 in 1961, whereas New York's share of electoral votes in 1961 was $\frac{45}{538} = 0.083643$ (Mann and Shapley 1962: 12–13). Generally, then, a very good approximation of φ is $\frac{e}{E}$, where e is the state's number of electoral votes and E is the total number of electoral votes. Large states are therefore advantaged by the Electoral College system, but their advantage is not significantly different from their representational weight in the U.S. Congress.

3 Pivotal states

One potential problem with the Shapley and Shubik index is an assumption that all coalitions are equally likely to form, or, equivalently, that the order in which players join a coalition is completely random. Riker (1973: 160) argues that this assumption is tenable "under a constitution where a very large number of coalitions will occur in daily politics over the years." He also suggests that in the absence of any knowledge about the social circumstances

[1] For n-player games, Shapley values are determined independently of any strategies that players might use to realize them.

[2] Mann and Shapley did not solve the computational problem of computing power indices with k as large as 51 until 1962. Subsequently, Riker and Shapley (1966) reported that a good approximation of the SS power index is given by $[\frac{e_j}{(E-e_j)}] \cdot [\frac{(k-1)}{k}]$, where, for the Electoral College, k is the number of states, e_j is the number of electoral votes in state j, and E is the total number of electoral votes across all states For a medium-sized state where $e_j = 15$ and $E = 538$, a state's voting power is well-approximated by $\frac{e_j}{E}$. Generally, one can simply use size as an approximation of power without engaging in the complicated numerical computations necessary to obtain Shapley-Shubik values. See Owen (1975) also on this point.

of the players, it is reasonable to consider one coalition as likely to form as another. These justifications seem reasonable for legislative voting where coalitions form frequently, but they are less plausible for the Electoral College that meets once every four years.

To illustrate how critical the equal likelihood assumption is to the analysis of power in the Electoral College, consider a simple example of four states, A, B, C, and D, with electoral votes 12, eight, four, and three, respectively. The $n! = 24$ possible coalitions are as follows, with pivots determined by additions of members from left to right. Pivots are underscored. A simple majority requires 14 votes.

A$\underline{\text{B}}$CD	B$\underline{\text{A}}$CD	C$\underline{\text{A}}$BD	D$\underline{\text{A}}$BC
A$\underline{\text{B}}$DC	B$\underline{\text{A}}$DC	C$\underline{\text{A}}$DB	D$\underline{\text{A}}$CB
A$\underline{\text{C}}$BD	BC$\underline{\text{A}}$D	CB$\underline{\text{A}}$D	DB$\underline{\text{A}}$C
A$\underline{\text{C}}$DB	BC$\underline{\text{D}}$A	CB$\underline{\text{D}}$A	DB$\underline{\text{C}}$A
A$\underline{\text{D}}$BC	BD$\underline{\text{A}}$C	CD$\underline{\text{A}}$B	DC$\underline{\text{A}}$B
A$\underline{\text{D}}$CB	BD$\underline{\text{C}}$A	CD$\underline{\text{B}}$A	DC$\underline{\text{B}}$A

Under the assumptions of equally likely coalitions and majority voting, state A pivots twelve times and so has a power index of $\varphi = 0.5$; and B, C, and D each pivot four times with $\varphi = 0.166$.[3] Suppose, however, that the states' popular vote shares for the winning candidate are 0.65 for A, 0.6 for B and C, and 0.55 for D. Then, if states join the coalition in order of their vote shares, state A always joins first and D always joins last. Hence, states A and D will never pivot, and power is shared equally by states B and C. This example, although contrived, makes the crucial point: when the assumption of equally likely coalitions breaks down, the *a priori* SS index may not reflect the actual power relations among states.

As an alternative to the assumption of equally likely coalitions, I assume that coalitions form in the order of their popular vote shares for the winning candidate, where states with the largest within-state vote shares for the winner commit first. This approach to determining the pivotal state follows directly from Shapley and Shubik's (1954: 788) suggestion that the order in which players join a coalition be thought of "as an indication of the relative degrees of support by the different members, with the most enthusiastic members 'voting' first, etc." When applied to the Electoral College, this interpretation suggests that strongly Democratic (or Republican) states should commit first, and less fervid, marginal states later.

To be precise, the order of coalition formation and the definition of a pivotal state are as follows.

Order of Coalition Formation: When states are ranked from high to low according to their within-state shares of the two-party vote for the candidate who wins the national election, the winning candidate's coalition forms in the order in which states are ranked.

Pivotal State: Given the order of coalition formation defined above, in which case electoral votes are cumulated from the top of the order, and assuming states cast their

[3] The same scores would obtain by considering only minimal winning coalitions. In the example, there are 18 MWCs, comprised of either two or three states. When the MWC consists of three states, then only one state is left to join after the pivot, and so no additional coalitions are generated by considering oversized coalitions. When the MWC contains two states—one of them must be A—there are two different ways that the remaining two states can join after the pivot. (In general, there will be $(n - k)!$ ways that remaining states can join a MWC of size k.) However, the pivotal state remains the same when additional states join the coalition, and so the proportion of coalitions in which a state is pivotal remains constant when the total number of coalitions increases from minimal winning to oversized.

electoral votes as a bloc, then the pivotal state is the state that provides the minimal number of votes required for victory (i.e., a simple majority of all electoral votes).

Several implications about pivotal states follow from this assumption and definition. First, when coalitions are not equally likely, large states will not necessarily be pivotal. A very large state, such as Texas, for example, which currently provides large winning margins for Republican candidates, is unlikely to pivot because it effectively joins Republican candidates' coalitions very early. States that provide smaller winning vote margins, even if they have fewer electoral votes, are more likely to pivot because they join the coalition later in the sequence. Second, pivotal states will not necessarily be swing states or competitive states—that is, states with a nearly 50:50 partisan balance, so that both candidates have an equal chance of winning. Take the 1984 election, for example, in which Ronald Reagan won every state except Minnesota and the District of Columbia. One of the most competitively balanced states that year was Massachusetts, where the two-party vote split roughly 51:49 in Reagan's favor. Although Massachusetts was one of the few swing states that year, it was certainly not pivotal, as Reagan's Electoral College coalition was considerably oversized even without Massachusetts. Only Minnesota and the District of Columbia produced smaller vote shares for Ronald Reagan in 1984.

A third implication of the ordering assumption is that pivotal states should closely reflect the national trend. That is, pivotal states will generally be those where the within-state vote shares of the two candidates closely represent the popular vote shares of the two candidates nationally. In this sense, pivotal states in the Electoral College will be representative of the national popular vote. Tufte and Sun (1975) refer to states that closely mirror the national vote division as "barometric bellwethers" (see also Jones 2002). Intuitively, the reason these bellwether states are likely to be pivotal is that, when the sequence of joining is determined by states' vote shares for the winning candidate, states whose vote shares for the winning candidate are similar to the national vote share will typically be close to the middle of the sequence of coalition formation.

The proposition below establishes the conditions under which the popular vote outcome in the pivotal state will exactly mirror the national popular vote outcome.

Proposition 1 *Given an order of coalition formation and a pivotal state as defined above, let N_1 be the total number of votes cast for both candidates in states before the pivotal state and N_2 the total number of votes cast in states after the pivotal state. Then, when V_1 is the national winner's vote share in the N_1 states, V_2 is the national winner's vote share in the N_2 states, v is the national winner's vote share in the pivotal state, and V is the national winner's share over all states,*

$$v = V \quad \textit{if and only if} \quad \left(\frac{N_1}{N_2}\right) = \frac{(V - V_2)}{(V_1 - V)}. \tag{1}$$

Proof Let n be the total number of two-party votes cast in the pivotal state. The number of two-party votes cast in all states is therefore $N = N_1 + n + N_2$, and the winning candidate's national vote share can be expressed as $V = V_1(\frac{N_1}{N}) + v(\frac{n}{N}) + V_2(\frac{N_2}{N})$. Solving this expression for v yields $v = \frac{VN - V_1N_1 - V_2N_2}{n}$, and substituting for N gives $v = V + (\frac{N_1}{n})(V - V_1) + (\frac{N_2}{n})(V - V_2)$. Since states are ordered and the states comprising V_1 do not constitute a majority, $V_1 > V > V_2$. Hence, $v = V$ if and only if $(\frac{N_1}{n})(V - V_1) = (\frac{N_2}{n})(V - V_2)$. Rearranging gives $v = V \Leftrightarrow (\frac{N_1}{N_2}) = \frac{(V-V_2)}{(V_1-V)}$. □

Briefly, the proposition divides states into pre-pivotal states—those that join the winning candidate's coalition before the pivotal state—and post-pivotal states—states that join after the pivotal state or else do not join the winning coalition at all. The proposition defines three quantities: (1) the ratio of the total number of votes cast in pre-pivotal states to the total number of votes cast in post-pivotal states, $(\frac{N_1}{N_2})$; (2) the difference between the winning candidate's national vote share and the winning candidate's vote share in all post-pivotal states, $(V - V_2)$; and (3) the difference between the winning candidate's vote share in all pre-pivotal states and the winning candidate's national vote share, $(V_1 - V)$. The proposition then states that (1) must be proportional to the ratio of (2) and (3). For example, suppose the national two-party vote share for the winner is $V = 0.55$ and $(\frac{N_1}{N_2}) = 1.5$, so that 1.5 times as many votes are cast in pre-pivotal than in post-pivotal states. Then the vote share for the winning candidate in the pivotal state will be $v = 0.55$ if and only if $\frac{(V-V_2)}{(V_1-V)} = 1.5$, or if $V_1 = 0.6$ and $V_2 = 0.475$.

How much v actually deviates from V is an empirical question addressed below. Since states' electoral votes tend to be proportional to their populations, v should be a fairly close approximation of V. However, if a small and large state have vote shares equally close to V, then the large state should be more likely to pivot because the large state is more likely to provide the decisive electoral vote. A small state could be very close to the last state needed to establish a minimum winning coalition, yet not have enough mass to establish a winning coalition. Nevertheless, small states can sometimes pivot if they closely reflect national voting patterns. Under the weighted voting scheme of the Electoral College, a small state positioned near the middle of the sequence will have a better chance of pivoting than a large state located at the start of the sequence.

4 The empirical analysis of pivotal states

The pivotal state is determined empirically by first ordering all states according to their presidential vote shares. States are arrayed from the highest Democratic presidential vote share to the lowest when a Democrat wins, and from the highest Republican presidential vote share to the lowest when a Republican wins. Electoral votes are then cumulated over all states voting for the winner, beginning with the state producing the highest vote share for the winner. The pivotal state is the state that provides the 270th electoral vote, or for elections prior to 1964 when there were fewer than 538 total electoral votes, the number necessary for a majority. This approach yields a dichotomous measure of whether or not a state is pivotal in a given election.

Pivotal states are of obvious importance, but also important are *nearly* pivotal states. States that precede the pivot by one or two places, or else follow the pivot closely, may have substantive political significance. The logic of pivoting is that politicians are willing to pay more to entice states into the coalition the closer the coalition comes to minimum winning. If politicians are uncertain about which of a relatively small set of states will pivot, then states close to the pivot should generally get more attention from politicians than states far from the pivot. A pivot-proximity score takes into account each state's proximity to the pivotal state.

The first step in computing a pivot-proximity score is to order states according to their statewide vote shares for the winning candidate and whether they fell before or after the pivot. The pivotal state is given a score of zero, the state ranking just ahead of the pivot is given a score of -1, the state ranking two places ahead of the pivot is given a score of -2, and so forth. The state falling just after the pivot is given a score of $+1$, the state ranking two places after the pivot is given a score of +2, and so forth. These ranking scores reflect a state's relative proximity to the pivot and not whether they were in the winning coalition or not. The absolute value of a state's ranking is then taken to be the state's pivot-proximity score.

One disadvantage of scoring states in this way is that states located the same number of places before and after the pivot will have identical scores, and no distinction is made between the winning and losing coalitions. Other scoring rules can avoid these problems, but they are not as easily interpretable as the pivot-proximity measure. An advantage of the present measure is that the larger a state's pivot-proximity score, the farther it is from the pivotal state. This interpretation is straightforward, and when averaged across elections, the pivot-proximity score simply indicates the extent to which a state fluctuates around, or is, the pivotal state.

Using these two measures of pivoting, and given the considerations of the previous section, the central questions of the following analyses concern the extent to which pivotal states are large states, competitive states, and bellwether states. Taking the dichotomous measure first, Table 1 lists the pivotal state in each election from 1880 to 2004, together with the state that joined the winning candidate's coalition just before the pivotal state.[4] For example, New York was pivotal in both 1880 (Garfield v. Hancock) and 1884 (Cleveland v. Blaine), preceded by Connecticut in both cases; and Ohio was pivotal in 1896 (McKinley v. Bryan), preceded by West Virginia.[5] These data support the conventional wisdom about presidential elections with only a couple of exceptions. As expected, Florida and Ohio were pivotal in the 2000 and 2004 elections, respectively. In 1888, New York was pivotal, consistent with historian Richard Welch's (1988) observation that New York and Indiana were the "key states" in the election between Cleveland and Harris. In the 1916 election, the outcome eventually came down to four states—California, Minnesota, New Mexico, and North Dakota. However, once Minnesota went to Hughes, California proved pivotal for Wilson (Clements and Cheezum 2003).

The conventional wisdom for these elections is consistent with the evidence, but the 1960 election is not. Theodore H. White (1961: 377) asserted that, "It was Michigan, in fact, that marked the passage of power from one party to the other." A more common interpretation is that voter fraud in Cook County, Illinois, put Kennedy over the top. Yet neither of these interpretations squares with the empirical evidence here. Missouri, by the measure in Table 1, was pivotal in 1960. Michigan joined the coalition five states earlier than Missouri, and once Kennedy carried Missouri, Illinois was not essential to the coalition. This election underscores the importance of having well-defined empirical measures to evaluate journalistic and impressionistic accounts of elections.

In general, the pivotal states listed Table 1 are quite different from the theoretical prediction of the Shapley-Shubik algorithm, which always predicts that the largest state will be pivotal. Under the theoretical assumption that all coalitions are equally likely to form, New York, the largest state from 1880 to 1968, is predicted to be pivotal in every election from 1880 through 1968, and California, the largest state from 1972 to the present, is predicted to pivotal in all elections since 1972. Thus, contrary to frequent claims that the Electoral College benefits only the largest states, Table 1 reveals that pivotal states are frequently small

[4]Given the problems in validating electoral votes in the disputed election of 1876, and because some southern states were still disenfranchised under Reconstruction as late as 1872, I chose the election of 1880 for the beginning of the time series.

[5]Including third-party votes generally does not change the results in Table 1, except for the elections of 1912, 1968, and 1992. Ranking states by the winner's share of the popular vote instead of the two-party vote in those elections changes the pivot to New York in 1912, Florida in 1968, and Georgia in 1992.

Table 1 Pivotal states and winners' vote shares, 1880 to 2004

Election	Pivotal state	State before pivot	Winner's statewide share of two party vote	Winner's national share of two party vote
1880	New York	Connecticut	0.510	0.500
1884	New York	Connecticut	0.500	0.501
1888	New York	Ohio	0.506	0.496
1892	Illinois	Connecticut	0.516	0.517
1896	Ohio	West Virginia	0.524	0.522
1900	Illinois	Delaware	0.543	0.532
1904	New Jersey	Connecticut	0.598	0.600
1908	West Virginia	New York	0.553	0.545
1912	Missouri	Illinois	0.614	0.604
1916	California	North Dakota	0.502	0.516
1920	Idaho	Rhode Island	0.656	0.639
1924	New York	Oregon	0.657	0.652
1928	Illinois	Minnesota	0.574	0.588
1932	Iowa	Kentucky	0.591	0.592
1936	Ohio	Missouri	0.608	0.625
1940	Pennsylvania	Connecticut	0.535	0.550
1944	New York	Connecticut	0.525	0.538
1948	California	Illinois	0.502	0.523
1952	Michigan	Maryland	0.558	0.554
1956	Louisiana	Nevada	0.574	0.578
1960	Missouri	New Mexico	0.502	0.502
1964	Washington	Ohio	0.624	0.613
1968	Ohio	Alaska	0.513	0.504
1972	Ohio	Maine	0.610	0.618
1976	Wisconsin	Mississippi	0.509	0.510
1980	Illinois	Oregon	0.543	0.535
1984	Michigan	Delaware	0.595	0.592
1988	Michigan	Louisiana	0.539	0.539
1992	Colorado	Iowa	0.528	0.535
1996	Pennsylvania	Oregon	0.552	0.547
2000	Florida	New Hampshire	0.500	0.497
2004	Ohio	Nevada	0.510	0.512

or medium-sized states. Among large states, New York has pivoted five times, Ohio five times, Illinois four times, and California, Michigan, and Pennsylvania each twice. However, small or medium-sized states have also been pivotal. New Jersey, the fourteenth largest state in 1904, was pivotal that year, West Virginia was pivotal in 1908, Missouri in 1960, Idaho in 1920, Iowa in 1932, Louisiana in 1956, and Colorado in 1992. The latter are important exceptions to the large-state prediction in much of the existing literature. In short, a small or medium-sized state has been pivotal in nearly one-fourth of the presidential elections since 1880. Size *per se*, therefore, is neither necessary nor sufficient to pivot.

Table 1 also establishes that pivotal states are not necessarily competitive states. The winner's vote share of the two-party vote in the pivotal state often deviates considerably from a perfectly competitive outcome of one-half. Across the 32 elections, the average vote share for the winning candidate in the pivotal state is 0.552; however, in six of the elections, the winner's vote share exceeded 0.60, and in thirteen elections it exceeded 0.55. Hence, competitive states should not be confused with pivotal states, even though pivotal states are competitive on average across all elections.

Finally, Table 1 provides a test of the conditions of Proposition 1 under which pivotal states will be bellwethers. If the proportionality conditions defined in the proposition generally are satisfied, then the popular vote division in pivotal states should closely reflect the national vote division. Of the 32 elections profiled in Table 1, the average absolute deviation of the winner's share of the two-party vote in the pivotal state from the winner's share nationally is a miniscule 0.0074 with a standard deviation of 0.058. Thus, the percentage of the statewide vote for the winning candidate in the pivotal state deviates on average by less than one percent from the winner's percentage of the national two-party vote. Moreover, in eleven of the elections, the winner's share of the statewide vote is equal to the winner's share of the national vote when rounded to two decimal places. Exceptions to the proportionality conditions of the proposition are therefore relatively mild. The pivotal state is a barometric bellwether in the sense that the statewide vote share for the winning candidate in the pivotal state is very close to the winner's share of the national vote.

Table 2 employs the pivot-proximity measure and lists states ordered from lowest to highest on their average pivot-proximity scores across the 32 elections. The mean of these scores is 12.49 with a standard deviation of 4.38, where lower scores indicate greater proximity to the pivotal state. Ohio has the lowest pivot-proximity score across the 32 elections, followed by Illinois, Missouri, New Mexico, and Delaware. Also listed in Table 2 is an average bellwether score for each state over the 32 elections. The bellwether score for a state in a given election is the absolute difference between the share of the statewide two-party vote for the winning candidate and the national share of the two-party vote for the winning candidate. Thus, the more closely the vote division within a state mirrors the national vote division, the lower the bellwether score. When averaged across all 32 elections, Ohio has the lowest bellwether score, followed by Missouri and then Illinois.

States ranking highly on the bellwether score also rank highly on the pivot-proximity measure, although there are notable exceptions. Oregon, for example, ranks much higher on the pivot-proximity score in Table 2 than on the bellwether score, and West Virginia ranks much higher on the bellwether than on the pivot-proximity score. Overall, the correlation between the two scores is .67. A state's bellwether score, therefore, is not a perfect substitute for its pivot position. All pivotal states will be bellwethers, but not all bellwethers will be pivotal. Another property of the pivot-proximity score is that it is highly correlated with the percentage of elections in which a state voted for the winning presidential candidate.[6] That correlation coefficient is -0.73. Thus, states that typically are close to the pivotal state also tend to vote for the winning candidate. This tendency is due in part to the fact that candidates' winning coalitions are usually over-sized. The average size of a winning candidate's coalition in terms of states voting for him in the Electoral College is 33.9 and ranges from a low of 20 in the elections of 1880 to 1888 to a high of 49 in 1972.

[6] Ohio is also the state that has most frequently voted for the winning candidate, having done so in 28 of the 32 elections. New Mexico has voted for the winning candidate a higher percentage of the time—92% of the time—but has participated in only 24 of the 32 elections.

Table 2 States ranked by pivot-proximity (average absolute deviation from pivot), 1880 to 2004

State	Pivot-proximity: average absolute deviation from pivot	Bellwether score (ranking)
Ohio	4.5	0.023 (1)
Illinois	6.1	0.032 (3)
Missouri	6.5	0.025 (2)
New Mexico	6.5	0.036 (6)
Delaware	7.0	0.033 (4)
Oregon	7.4	0.043 (13)
Connecticut	7.6	0.037 (7)
New York	7.7	0.040 (10)
New Jersey	7.8	0.035 (5)
Maryland	8.5	0.039 (9)
California	8.5	0.048 (16)
Wisconsin	8.5	0.041 (11)
Pennsylvania	8.6	0.046 (15)
Iowa	8.8	0.048 (17)
West Virginia	8.8	0.038 (8)
Kentucky	9.2	0.045 (14)
Montana	9.4	0.053 (21)
Michigan	9.6	0.050 (19)
Indiana	9.8	0.042 (12)
New Hampshire	10.0	0.050 (18)
Washington	10.2	0.051 (20)
Colorado	10.9	0.072 (27)
Nevada	11.1	0.066 (24)
Minnesota	11.5	0.067 (25)
Tennessee	11.8	0.063 (23)
Hawaii	12.1	0.062 (22)
Virginia	12.6	0.082 (31)
Massachusetts	13.0	0.079 (29)
Maine	13.1	0.076 (28)
Rhode Island	13.7	0.084 (34)
North Carolina	13.8	0.082 (32)
Florida	14.4	1.274 (42)
South Dakota	14.5	0.082 (33)
Wyoming	14.9	0.090 (36)
Arizona	15.0	0.070 (26)
Arkansas	15.3	1.294 (43)
Texas	15.5	1.636 (45)
Louisiana	16.2	1.869 (46)
Oklahoma	16.4	0.081 (30)
Kansas	16.7	1.080 (40)
North Dakota	16.8	1.103 (41)
Idaho	16.8	1.069 (39)
Vermont	17.0	1.297 (44)
Nebraska	17.4	1.030 (37)
Utah	17.8	1.050 (38)
Alaska	18.1	0.090 (35)
Alabama	18.5	1.970 (47)
Georgia	18.5	2.041 (48)
Mississippi	20.8	2.739 (50)
South Carolina	21.0	2.669 (49)
District of Columbia	21.0	3.674 (51)

Table 3 Prediction of pivotal state and pivot position in the Electoral College, 1880 to 2004

Independent variable	Dependent variable						
	Pivotal state (1 = yes, 0 = no)				Pivot-proximity		
Electoral votes	0.041	0.038		0.113	−0.187	−0.113	−0.246
	(8.18)	(7.68)		(5.86)	(−9.68)	(−7.15)	(−13.52)
Electoral competitiveness		0.054		0.075		−0.489	−0.402
		(5.52)		(0.97)		(−31.46)	(−23.15)
Bellwether score			−0.073	−0.0445			−0.0134
			(−7.61)	(−2.67)			(−10.03)
Electoral votes × Bellwether				−0.004			0.0027
				(−3.87)			(10.03)
Constant	−2.69	−5.05	−0.57	−5.63	14.89	34.58	31.56
	(−5.68)	(−8.72)	(−0.98)	(−1.50)	(13.67)	(34.91)	(30.88)
Pseudo R^2	0.13	0.16	0.36	0.51			
R^2					0.06	0.44	0.47
N	1525				1525		

The extent to which pivoting is a function of size, competitiveness, and bellwether status is tested in the regressions of Table 3. The data for Table 3 are the pooled elections across all states from 1880–2004.[7] The first column of Table 3 reports probit coefficients where the dependent variable is whether or not a state was pivotal in an election, and the lone predictor is a state's size—the state's allocated number of electoral votes for that election. In parentheses are t-statistics computed from robust standard errors. State size is a statistically significant predictor in the first estimation, but the overall fit of the model is relatively poor. Adding a measure of a state's electoral competitiveness to the model improves the fit only marginally.[8] Electoral competitiveness is measured here as (50− | 50− statewide percentage of the two-party vote for the winning candidatel), so that larger values indicate more competitive states. Hence, if competitive states are more likely to pivot, then the coefficient should be positively signed, which it is.

The best single predictor of pivoting in Table 3 is a state's bellwether score (column three). It alone accounts for roughly 36% of the variance in pivoting across years and states. Recall that the bellwether score is the absolute difference between the winning candidate's national vote share and the candidate's statewide vote share, so that the expected sign of the bellwether coefficient will be negative in that pivotal states are expected to mirror the national voting trend. The fourth column of Table 3 reports the estimation of the fully specified model, including as well an interaction between bellwether and size. The reason for the interaction is that pivotal states should not only reflect the national vote division, but also have enough electoral votes to provide a winning margin. Consequently, the effect of bellwether properties on pivoting should be affected by size, where the bellwether effect is more pronounced for large states. With all variables and the interaction included in the estimation, the full model fits relatively well, with the pseudo R^2 increasing to 0.51. Competitiveness

[7] Dummy variables for each election through 2000 were included in the estimation, but coefficients are not reported here.

[8] With competitiveness as the sole predictor, the pseudo R^2 is 0.06.

is no longer a significant predictor in this model, but size remains statistically important. Thus, pivotal states and competitive states are not only analytically distinct concepts, but empirically distinct as well. Size, in contrast, remains an important predictor of pivoting. As expected, pivotal states should not only reflect the national vote division, but also have enough electoral votes to provide a winning margin.

The final three columns of Table 3 report OLS estimates using as the dependent variable the pivot-proximity score instead of the dichotomous pivoting variable. Large values of pivot-proximity indicate that states are *farther* from the pivotal state, and thus the expected signs of the coefficients for competitiveness, size, and bellwether status should all be negative. Indeed, electoral competitiveness has a negative sign and is a significant predictor of a state's proximity to the pivotal state. The bellwether score is also negative and significant, as is its interaction with electoral votes. The sign of the interaction is now positive because the effects of both bellwether and size are negative. In this second set of regressions, unlike in the previous set with pivoting as the dependent variable, once bellwether effects are controlled, competitiveness continues to vary and exert a strong effect on a state's pivot position.[9] Competitiveness therefore explains *proximity* to the pivot, but it does not account for whether a state is pivotal. The reason is that most presidential elections are relatively competitive, so that competitive states should be clustered around the pivot when states are ordered by their vote shares for the winning candidate. In summary, with the exception of competitiveness, the pivot-proximity measure yields results very similar to the dichotomous measure of pivoting.

5 Pivotal states in campaigns

One test of the relevance of an empirical measure of pivoting is whether it is useful for explaining candidates' campaign strategies. Since candidates must win the pivotal state, their resources must last through at least the pivotal state, and thus a state's proximity to the pivotal state may factor into candidates' decisions about where to compete, even when controlling for a state's size, electoral competitiveness, and bellwether properties. Candidates may be uncertain about exactly which state will be pivotal, and so resources will probably be distributed around the pivotal state, but one would not expect substantial resources to be allocated to states joining before the pivot or long after it. In addition, since pivotal states will always be bellwether states in the sense of accurately reflecting the national vote share of the winning candidate, pivotal states should be important testing grounds for national campaigns. Campaigns that succeed in bellwether states should succeed in enough other states to ensure a victory.

A test of the importance of pivot-proximity for campaigning is possible with data available in Shaw (2006). For the 2000 and 2004 campaigns, Shaw reports the number of presidential visits to each state during the fall campaign and the number of gross rating points (GRP) purchased in each state during a week of the fall campaign.[10] Dichotomous transformations of these variables were regressed on measures of pivot-proximity, electoral votes, and electoral competitiveness, with proximity and competitiveness lagged by at least one

[9] The correlation between bellwether and competitiveness in the pooled data is -0.11.

[10] Shaw (2006) also provides raw dollar expenditures for TV buys. Both variables—dollars and GRPs—yield the same basic results in the analysis that follows. GRPs are an estimate of the number of times, on average, an ad is viewed by every person in a television market.

Table 4 Allocation of Democratic and Republican campaign resources, 2000 to 2004

Independent variable	Dependent variables							
	Democrats				Republicans			
	Visits		GRP		Visits		GRP	
	2000	2004	2000	2004	2000	2004	2000	2004
Electoral votes	0.036	0.13	−0.013	−0.012	0.032	0.024	0.020	−0.024
	(1.37)	(0.58)	(−0.61)	(−0.37)	(1.28)	(1.26)	(0.84)	(−0.69)
Electoral	−0.026	−0.12	−0.49	−0.68	−0.029	−0.094	−0.062	−0.040
competitiveness	(−0.40)	(−2.30)	(−0.95)	(−0.76)	(−0.48)	(−1.99)	(−1.21)	(−.40)
Pivot-proximity	−0.20	−0.26	−0.22	−0.32	−0.18	−0.20	−0.23	−0.31
	(−3.38)	(−3.52)	(−3.70)	(−3.14)	(−3.29)	(−3.67)	(−3.68)	(−3.22)
Constant	3.04	7.01	4.66	5.77	2.92	5.91	5.10	4.84
	(0.92)	(2.62)	(1.74)	(1.25)	(0.98)	(2.41)	(1.88)	(0.96)
Pseudo R^2								
Full model	0.38	0.41	0.38	0.54	0.34	0.36	0.40	0.57
Pivot-proximity	0.35	0.30	0.36	0.53	0.31	0.27	0.38	0.56
N	51				51			

election to reduce simultaneous causation between these variables and the allocation of resources. To reduce correlation among the independent variables, competitiveness and pivot-proximity scores were averaged over the three previous campaigns. Thus, for the 2000 election, whether or not a state received a campaign visit is predicted by a state's number of electoral votes in 2000, the average of the state's electoral competitiveness in the 1988–1996 elections, and the average of the state's pivot-proximity scores for the 1988–1996 campaigns.[11] Since many states received no campaign visits and had no television buys, the dependent variables for visits and media expenditures were coded '1' for states where visits and buys occurred and '0' elsewhere.[12]

The regression results appear in Table 4. Entries are probit coefficients and asymptotic t-values. The coefficients are fairly consistent between parties and across campaigns. Of the three variables, only pivot position attains statistical significance and is correctly signed in all equations. Smaller values of pivot-proximity imply that states are closer to the pivotal state, and thus both visits and media buys increase significantly at the margin the closer a state is to the pivot. Size, as measured by electoral votes, is not a significant predictor of resource allocation across states in any of the estimations. The coefficient for electoral competitiveness attains statistical significance in 2004 for both Democratic and Republican visits, but the sign is negative, indicating that there were marginally *fewer* presidential visits in more competitive states.

[11] Correlations between the averaged pivot-proximity and competitive scores are −0.55 for 2000 and −0.61 for 2004. Absolute correlations among other variables and years are all less than 0.25. Excluded is the bellwether factor. Even with averaging, the bellwether factor is highly correlated with competitiveness for the close elections of 2000 and 2004.

[12] The analysis was also conducted using the untransformed data and tobit estimation. The tobit and probit estimations yield almost identical patterns of coefficients and standard errors, but the probit specification yields larger pseudo-R^2 values.

Generally, pivot position dwarfs the other variables in terms of predictive power in Table 4. Judging from pseudo R^2 values, pivot position alone performs almost as well as the full model. This is understandable given the strong dependence of pivot-proximity on both size and competitiveness. Both variables, as revealed in Table 3, are quite important for determining a state's pivot position, and therefore both size and competitiveness exert indirect effects via pivot position on candidates' decisions about where to campaign. However, since pivot position encapsulates both effects, together with the bellwether effect, pivot position alone is an excellent predictor of campaign resource allocation.

6 Conclusion

Scholars have applied different assumptions and definitions of power to the question of which states are most or least advantaged by the Electoral College. The definition of a pivotal state has been ambiguous, and states have been assumed to vote randomly in the Electoral College. This paper uses a precise definition of pivoting based on Shapley and Shubik's (1954) theoretical concept of power in weighted voting systems, and it assumes that states, instead of voting randomly, vote in the order of their popular vote shares for the winning candidate. Specifically, coalitions are assumed to form sequentially following the suggestion of Shapley and Shubik (1954: 788).

The empirical results reveal, first, that large states do not have as big of an advantage in the Electoral College as much of the existing literature suggests. Small and medium-sized states have been pivotal in roughly one-fourth of the elections since 1880. Second, pivotal states are not always competitive states. As defined and measured here, electoral competitiveness is neither necessary nor sufficient for pivoting. A third result is that pivotal states have the important property of being "barometric bellwethers"—states whose vote shares for the winning candidate closely reflect the national vote share for the winning candidate. Finally, a state's proximity to the pivotal state is an excellent predictor of how presidential campaigns allocate time and money across states. Campaigns allocate more time and money to states closer to the pivot than to those far away. Once pivot-proximity is taken into account, size and competitiveness have little direct effect on the allocation of campaign resources.

The analysis has several implications for current debates about Electoral College reform. First, the ability of small states occasionally to determine the outcome of the Electoral College suggests that residents of large states do not have as much power in presidential elections as previously thought (e.g., Longley and Dana 1984; Polsby and Wildavsky 1996). Proposals to abolish the Electoral College or to institute proportional allocation of electors, which presumably would enhance the power of smaller states, are therefore not as compelling as some critics claim. Reformers must recognize that the issue of power involves more than just size. Small states that closely approximate national trends often exert far more influence in the Electoral College than their voting weight suggests.

Second, the tendency for pivotal states to reflect the national vote division implies that the Electoral College does not produce significant distortions in electoral power from what might be achieved under direct election. Some opponents of the Electoral College object to the fact that a candidate's share of electoral votes often differs from his share of the popular vote. The popular vote share, which would establish the winner under a direct election arrangement, is thought to be a better indicator of a candidate's true national support (e.g., Edwards 2006: 35). An empirical conclusion of the present paper, however, is that the most powerful states in the Electoral College are those that accurately reflect the national popular vote share. Hence, even though a candidate's electoral and popular vote shares differ, the Electoral College system rewards states that mirror the national popular vote.

Finally, evidence that power in the Electoral College is a function not only of size, but also of where a state ranks relative to others in the winner's vote share, is a useful reminder of the nature of democratic politics. Being the biggest, or having the most, is usually not the key to winning in politics. When outcomes are decided by majority voting, one must exhibit moderate characteristics on the dimension over which outcomes are evaluated in order to be in a position to leverage the outcome. Actors exhibiting extreme characteristics, even when endowed with more votes than others, will either be taken for granted or else deemed inessential to the winning coalition.

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