



Prime Time for a Look at the Electoral College

Session S028

Nautilus 2, 11:30 am – 12:20 pm

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Talk Outline

1. Overview
2. Origins of the Electoral College
3. How the Electoral College works today (and how we got here)
4. Analyzing power in the Electoral College
5. Arguments for and against it
6. What might the future hold?
7. Classroom discussions of political issues
8. Questions



The EC in the Constitution

Key Excerpts:

2: Each State shall appoint, in such Manner as the Legislature thereof may direct, a Number of Electors, equal to the whole Number of Senators and Representatives to which the State may be entitled in the Congress...

3: The Electors shall meet in their respective States, and vote by Ballot for two Persons, of whom one at least shall not be an Inhabitant of the same State with themselves... The Person having the greatest Number of Votes shall be the President, if such Number be a Majority of the whole Number of Electors appointed; and if there be more than one who have such Majority, and have an equal Number of Votes, then the House of Representatives shall immediately chuse by Ballot one of them for President; and if no Person have a Majority, then from the five highest on the List the said House shall in like Manner chuse the President... In every Case, after the Choice of the President, the Person having the greatest Number of Votes of the Electors shall be the Vice President...

4: The Congress may determine the Time of chusing the Electors, and the Day on which they shall give their Votes; which Day shall be the same throughout the United States.



Federalist #68 (A. Hamilton)

- Presidential selection by “men chosen by the people for the special purpose.”
- “A small number of persons, selected by their fellow-citizens from the general mass, will be most likely to possess the information and discernment required” to avoid a candidate with “talents for low intrigue, and the little arts of popularity.”
- Avoid “cabal, intrigue, and corruption” and secure executive independence.



Constitutional Convention

- Compromise between election by Congress and popular vote.
- Addressed concerns of slave-holding and smaller states.
- The Founders expected that:
 - Electors would be chosen based on a district system.
 - Each elector would make their decision independently (no party politics).
 - Most elections would be resolved by the House of Representatives.



Changes Over Time

- **Twelfth Amendment**
 - Separate elections for President and Vice-President
- **Rise of at-large popular vote**
 - 1800: 11 states chose electors by legislature, 3 by district method, 2 at-large (DE, VA)
 - By 1836, all but one state (SC) used the at-large popular vote method
- **Pledged electors**
 - Pledge to vote for their party's candidate
 - Occasional “faithless electors”
- **The short ballot**
 - Lists presidential and vice-presidential candidates instead of electors



Significant Events

- President decided by the House
 - 1800 (Thomas Jefferson)
 - 1824 (John Q. Adams)
- Winner lost the popular vote
 - 1824 (John Q. Adams)
 - 1876 (Rutherford B. Hayes)
 - 1888 (Benjamin Harrison)
 - 2000 (George W. Bush)
 - 2016 (Donald Trump)



How Many Votes are Needed?

- What portion of the popular vote is needed for an electoral victory?
- How does the answer change if we consider:
 - States with 43.6% of the population have a majority of electoral votes
 - Multiple candidates
 - Turnout



Measuring Power of States

- People per electoral vote
 - Smaller (so higher power) for smaller states
- Viewing the Electoral College as a weighted voting system
- Attempts to measure the power of individual voters



Weighted Voting Systems

- A type of “yes-no” voting system.
- Described by *weights* for each voter, or *player*, and a *quota* such that a *coalition*, or group of voters, is winning precisely when the sum of the weights meets or exceeds the quota.
- Is the Electoral College a weighted voting system?



Power Indices

- Voting power is not necessarily proportional to number of votes!
- The **Banzhaf Power Index** measures the proportion of coalitions where a given member is *critical* to the coalition winning.
- The **Shapley-Shubik Power Index** measure the proportion of *sequential* coalitions where a given member is *pivotal*.



Example

- A has 50 votes, B has 49 votes, C has 1 vote, and the quota is 51 votes.

- The winning coalitions are:

$\{A, B, C\}$

$\{A, B\}$

$\{A, C\}$



Example (slide 2)

$\{\underline{A}, B, C\}$

$\{\underline{A}, \underline{B}\}$

$\{\underline{A}, \underline{C}\}$

- A is critical 3 times, B once, and C once.
- So the Banzhaf power indices are:
 $A \frac{3}{5}, B \frac{1}{5}, C \frac{1}{5}$



Example (slide 3)

- The sequential coalitions are:

$\langle A, B, C \rangle$ $\langle A, C, B \rangle$

$\langle B, A, C \rangle$ $\langle B, C, A \rangle$

$\langle C, A, B \rangle$ $\langle C, B, A \rangle$

- A is pivotal 4 times, B once, and C once.
- So the Shapley-Shubik power indices are:
 A $4/6$, B $1/6$, C $1/6$



Electoral College Computations

- Not feasible to compute power indices by hand
 - $2^{51} \approx 2.25 \times 10^{15}$ possible coalitions (a bit less than half are winning)
 - $51! \approx 1.5 \times 10^{66}$ sequential coalitions
- Can be generated approximately or exactly by a computer using a variety of algorithms



Power of Individual Voters

- In a group of n voters, the probability of casting a decisive vote is proportional to $\frac{1}{\sqrt{n}}$ (Chamberlain and Rothschild, 1980)
- Combined with the power indices, this suggests that individual voters are more powerful in large states



A Priori Elections

- “*A priori*” voting power takes into account *only* the fundamentals of a voting rule
- Essentially assumes a “Bernoulli election” where each voter has a 50% chance of voting for each candidate



Real-World Voting Power

- Requires data on voter preferences to estimate
- “Voter Power Index” (fivethirtyeight.com)
 - The “relative likelihood that an individual voter in a state will determine the Electoral College winner”
 - Based on a proprietary model (alas)

Critiques of the Electoral College



- Uneven power distribution among states
- Focus on “swing states”
- Disparity with popular vote results
- Disincentivizes turnout and may encourage voter suppression
- Disenfranchises U.S. territories
- Confusing



Arguments for the Electoral College

- Avoids a regionally focused or urban-centered win.
- Prevents need for national run-offs or recounts.
- Respects federalism.
- Grants winner a mandate.



Routes to Change

- Constitutional amendment.
 - Proposed 1969 (filibustered in Senate), 1977, 2017
- Action by individual states
 - District-based electoral votes (Maine, Nebraska)
 - Proportionally based electoral votes
 - Subject to the same pressures that initially pushed states toward at-large popular vote
- Collective state action



National Popular Vote Interstate Compact

- An agreement among states to direct their electors to vote for the winner of the national popular vote.
- Only becomes effective when adopted by states with 270+ electoral votes.
- Presently adopted by MD, NJ, IL, HI, WA, MA, DC, VT, CA, RI, and NY.
- Does not require a constitutional amendment, but may require Congressional approval.



Class discussions

- Guidelines for discussing controversial topics (<http://www.crlt.umich.edu/publinks/generalguidelines>):
 - Identify a clear purpose
 - Establish ground rules
 - Listen respectfully, without interrupting
 - Criticize ideas, not individuals
 - Focus on methods and systems
 - Avoid blame, speculation, and inflammatory language
 - Model appropriate behavior
 - Re-direct the discussion as needed
 - Include everyone (or as many as possible)
 - Summarize discussion points at the end



Questions?

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The Electoral College in the Constitution

Article II, Section 1:

2: Each State shall appoint, in such Manner as the Legislature thereof may direct, a Number of Electors, equal to the whole Number of Senators and Representatives to which the State may be entitled in the Congress: but no Senator or Representative, or Person holding an Office of Trust or Profit under the United States, shall be appointed an Elector.

3: The Electors shall meet in their respective States, and vote by Ballot for two Persons, of whom one at least shall not be an Inhabitant of the same State with themselves. And they shall make a List of all the Persons voted for, and of the Number of Votes for each; which List they shall sign and certify, and transmit sealed to the Seat of the Government of the United States, directed to the President of the Senate. The President of the Senate shall, in the Presence of the Senate and House of Representatives, open all the Certificates, and the Votes shall then be counted. The Person having the greatest Number of Votes shall be the President, if such Number be a Majority of the whole Number of Electors appointed; and if there be more than one who have such Majority, and have an equal Number of Votes, then the House of Representatives shall immediately chuse [sic] by Ballot one of them for President; and if no Person have a Majority, then from the five highest on the List the said House shall in like Manner chuse the President. But in chusing the President, the Votes shall be taken by States, the Representation from each State having one Vote; A quorum for this Purpose shall consist of a Member or Members from two thirds of the States, and a Majority of all the States shall be necessary to a Choice. In every Case, after the Choice of the President, the Person having the greatest Number of Votes of the Electors shall be the Vice President. But if there should remain two or more who have equal Votes, the Senate shall chuse from them by Ballot the Vice President.

4: The Congress may determine the Time of chusing the Electors, and the Day on which they shall give their Votes; which Day shall be the same throughout the United States.

Twelfth Amendment:

Replaces #3 above with the following:

The Electors shall meet in their respective states, and vote by ballot for President and Vice-President, one of whom, at least, shall not be an inhabitant of the same state with themselves; they shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice-President, and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice-President, and of the number of votes for each, which lists they shall sign and certify, and transmit sealed to the seat of the government of the United States, directed to the President of the Senate;—The President of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates and the votes shall then be counted;—The person having the greatest number of votes for President, shall be the President, if such number be a majority of the whole number of Electors appointed; and if no person have such majority, then from the persons having the highest numbers not exceeding three on the list of those voted for as President, the House of Representatives shall choose

immediately, by ballot, the President. But in choosing the President, the votes shall be taken by states, the representation from each state having one vote; a quorum for this purpose shall consist of a member or members from two-thirds of the states, and a majority of all the states shall be necessary to a choice. And if the House of Representatives shall not choose a President whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice-President shall act as President, as in the case of the death or other constitutional disability of the President. The person having the greatest number of votes as Vice-President, shall be the Vice-President, if such number be a majority of the whole number of Electors appointed, and if no person have a majority, then from the two highest numbers on the list, the Senate shall choose the Vice-President; a quorum for the purpose shall consist of two-thirds of the whole number of Senators, and a majority of the whole number shall be necessary to a choice. But no person constitutionally ineligible to the office of President shall be eligible to that of Vice-President of the United States.

Power in Weighted Voting Systems

Banzhaf Power Index

- A member of a winning coalition is called **critical** if deleting them yields a non-winning coalition.
- The **total Banzhaf power** of a player is the total number of winning coalitions where they are critical.
- The **Banzhaf power index** of a player is their total Banzhaf power divided by the sum of all voters' total Banzhaf power.

Shapley-Shubik Power Index

- A **sequential coalition** is a possible ordering of all players.
- If we envision a larger coalition being formed as we move from left to right in a sequential coalition, the **pivotal player** is the one whose joining converts the coalition from non-winning to winning.
- The **Shapley-Shubik power index** of a player is the number of times they are pivotal divided by the total number of orderings ($n!$).

Example (*Game Theory and Politics*, Steven Bram, 1975):

Three voters (A , B , and C) with 50, 49 and 1 vote respectively; the quota is 51 votes

The winning coalitions, with critical players underlined, are: $\{\underline{A}, B, C\}$; $\{\underline{A}, \underline{B}\}$; $\{\underline{A}, \underline{C}\}$

So the Banzhaf power indices are: $A \frac{3}{5}$; $B \frac{1}{5}$; $C \frac{1}{5}$

The sequential coalitions, with pivotal players boldfaced, are:

$\langle A, \mathbf{B}, C \rangle$; $\langle A, \mathbf{C}, B \rangle$; $\langle B, \mathbf{A}, C \rangle$; $\langle B, C, \mathbf{A} \rangle$; $\langle C, \mathbf{A}, B \rangle$; $\langle C, B, \mathbf{A} \rangle$

So the Shapley-Shubik power indices are: $A \frac{4}{6} = \frac{2}{3}$; $B \frac{1}{6}$; $C \frac{1}{6}$

State	2010 Census Population	Population %	Electoral Votes	EV %	People/EV	Winner-Take-All?	Banzhaf Power Index	Shapley-Shubik Power Index	Individual "Banzhaf PI"	2016 "Voter Power Index"
California	37,253,956	12.066%	55	10.223%	677,345	Yes	11.361%	11.030%	2.366	<0.1
Texas	25,145,561	8.144%	38	7.063%	661,725	Yes	7.206%	7.322%	1.827	<0.1
New York	19,378,102	6.276%	29	5.390%	668,210	Yes	5.401%	5.483%	1.560	<0.1
Florida	18,801,310	6.090%	29	5.390%	648,321	Yes	5.401%	5.483%	1.584	2.5
Illinois	12,830,632	4.156%	20	3.717%	641,532	Yes	3.676%	3.715%	1.305	<0.1
Pennsylvania	12,702,379	4.114%	20	3.717%	635,119	Yes	3.676%	3.715%	1.311	2.9
Ohio	11,536,504	3.737%	18	3.346%	640,917	Yes	3.302%	3.331%	1.236	1.2
Michigan	9,883,640	3.201%	16	2.974%	617,728	Yes	2.929%	2.949%	1.184	3.2
Georgia	9,687,653	3.138%	16	2.974%	605,478	Yes	2.929%	2.949%	1.196	0.8
North Carolina	9,535,483	3.088%	15	2.788%	635,699	Yes	2.744%	2.760%	1.130	3.2
New Jersey	8,791,894	2.848%	14	2.602%	627,992	Yes	2.559%	2.571%	1.097	0.2
Virginia	8,001,024	2.591%	13	2.416%	615,463	Yes	2.374%	2.383%	1.067	2.0
Washington	6,724,540	2.178%	12	2.230%	560,378	Yes	2.190%	2.196%	1.074	<0.1
Massachusetts	6,547,629	2.121%	11	2.045%	595,239	Yes	2.006%	2.009%	0.997	<0.1
Indiana	6,483,802	2.100%	11	2.045%	589,437	Yes	2.006%	2.009%	1.002	<0.1
Arizona	6,392,017	2.070%	11	2.045%	581,092	Yes	2.006%	2.009%	1.009	1.5
Tennessee	6,346,105	2.055%	11	2.045%	576,919	Yes	2.006%	2.009%	1.012	<0.1
Missouri	5,988,927	1.940%	10	1.859%	598,893	Yes	1.823%	1.823%	0.947	<0.1
Maryland	5,773,552	1.870%	10	1.859%	577,355	Yes	1.823%	1.823%	0.965	<0.1
Wisconsin	5,686,986	1.842%	10	1.859%	568,699	Yes	1.823%	1.823%	0.972	2.1
Minnesota	5,303,925	1.718%	10	1.859%	530,393	Yes	1.823%	1.823%	1.006	1.7
Colorado	5,029,196	1.629%	9	1.673%	558,800	Yes	1.640%	1.638%	0.930	2.9
Alabama	4,779,736	1.548%	9	1.673%	531,082	Yes	1.640%	1.638%	0.954	<0.1
South Carolina	4,625,364	1.498%	9	1.673%	513,929	Yes	1.640%	1.638%	0.969	0.2
Louisiana	4,533,372	1.468%	8	1.487%	566,672	Yes	1.457%	1.453%	0.870	<0.1
Kentucky	4,339,367	1.405%	8	1.487%	542,421	Yes	1.457%	1.453%	0.889	<0.1
Oregon	3,831,074	1.241%	7	1.301%	547,296	Yes	1.274%	1.269%	0.827	0.4
Oklahoma	3,751,351	1.215%	7	1.301%	535,907	Yes	1.274%	1.269%	0.836	<0.1
Connecticut	3,574,097	1.158%	7	1.301%	510,585	Yes	1.274%	1.269%	0.857	0.2
Iowa	3,046,355	0.987%	6	1.115%	507,726	Yes	1.092%	1.086%	0.795	1.1
Mississippi	2,967,297	0.961%	6	1.115%	494,550	Yes	1.092%	1.086%	0.806	<0.1
Arkansas	2,915,918	0.944%	6	1.115%	485,986	Yes	1.092%	1.086%	0.813	<0.1
Kansas	2,853,118	0.924%	6	1.115%	475,520	Yes	1.092%	1.086%	0.822	0.1
Utah	2,763,885	0.895%	6	1.115%	460,648	Yes	1.092%	1.086%	0.835	0.2
Nevada	2,700,551	0.875%	6	1.115%	450,092	Yes	1.092%	1.086%	0.845	4.5
New Mexico	2,059,179	0.667%	5	0.929%	411,836	Yes	0.910%	0.903%	0.806	4.8
West Virginia	1,852,994	0.600%	5	0.929%	370,599	Yes	0.910%	0.903%	0.850	<0.1

State	2010 Census Population	Population %	Electoral Votes	EV %	People/EV	Winner-Take-All?	Banzhaf Power Index	Shapley-Shubik Power Index	Individual "Banzhaf PI"	2016 "Voter Power Index"
Nebraska	1,826,341	0.592%	5	0.929%	365,268	NO	0.910%	0.903%	0.856	<0.1*
Idaho	1,567,582	0.508%	4	0.743%	391,896	Yes	0.727%	0.721%	0.738	<0.1
Hawaii	1,360,301	0.441%	4	0.743%	340,075	Yes	0.727%	0.721%	0.792	0.2
Maine	1,328,361	0.430%	4	0.743%	332,090	NO	0.727%	0.721%	0.802	1.2*
New Hampshire	1,316,470	0.426%	4	0.743%	329,118	Yes	0.727%	0.721%	0.806	4.3
Rhode Island	1,052,567	0.341%	4	0.743%	263,142	Yes	0.727%	0.721%	0.901	1.1
Montana	989,415	0.320%	3	0.558%	329,805	Yes	0.545%	0.540%	0.697	0.2
Delaware	897,934	0.291%	3	0.558%	299,311	Yes	0.545%	0.540%	0.731	0.6
South Dakota	814,180	0.264%	3	0.558%	271,393	Yes	0.545%	0.540%	0.768	0.5
Alaska	710,231	0.230%	3	0.558%	236,744	Yes	0.545%	0.540%	0.822	1.7
North Dakota	672,591	0.218%	3	0.558%	224,197	Yes	0.545%	0.540%	0.845	<0.1
Vermont	625,741	0.203%	3	0.558%	208,580	Yes	0.545%	0.540%	0.876	0.3
District of Columbia	601,723	0.195%	3	0.558%	200,574	Yes	0.545%	0.540%	0.893	<0.1
Wyoming	563,626	0.183%	3	0.558%	187,875	Yes	0.545%	0.540%	0.923	<0.1

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State	2010 Census Population	Population %	Electoral Votes	EV %	People/EV	Winner-Take-All?	Banzhaf Power Index	Shapley-Shubik Power Index	Individual "Banzhaf PI"	2016 "Voter Power Index"
Oregon	3,831,074	1.241%	7	1.301%	547,296	Yes	1.274%	1.269%	0.827	0.4
Pennsylvania	12,702,379	4.114%	20	3.717%	635,119	Yes	3.676%	3.715%	1.311	2.9
Rhode Island	1,052,567	0.341%	4	0.743%	263,142	Yes	0.727%	0.721%	0.901	1.1
South Carolina	4,625,364	1.498%	9	1.673%	513,929	Yes	1.640%	1.638%	0.969	0.2
South Dakota	814,180	0.264%	3	0.558%	271,393	Yes	0.545%	0.540%	0.768	0.5
Tennessee	6,346,105	2.055%	11	2.045%	576,919	Yes	2.006%	2.009%	1.012	<0.1
Texas	25,145,561	8.144%	38	7.063%	661,725	Yes	7.206%	7.322%	1.827	<0.1
Utah	2,763,885	0.895%	6	1.115%	460,648	Yes	1.092%	1.086%	0.835	0.2
Vermont	625,741	0.203%	3	0.558%	208,580	Yes	0.545%	0.540%	0.876	0.3
Virginia	8,001,024	2.591%	13	2.416%	615,463	Yes	2.374%	2.383%	1.067	2.0
Washington	6,724,540	2.178%	12	2.230%	560,378	Yes	2.190%	2.196%	1.074	<0.1
West Virginia	1,852,994	0.600%	5	0.929%	370,599	Yes	0.910%	0.903%	0.850	<0.1
Wisconsin	5,686,986	1.842%	10	1.859%	568,699	Yes	1.823%	1.823%	0.972	2.1
Wyoming	563,626	0.183%	3	0.558%	187,875	Yes	0.545%	0.540%	0.923	<0.1