THE CONTINUING VALIDITY OF THE ELECTORAL COLLEGE: A QUANTITATIVE CONFIRMATION

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"Not my president!" That cry resounded across the nation in the wake of the 2016 election of Donald Trump, the second Republican candidate in the past two decades to ascend to the presidency despite receiving a minority of individual votes cast.[1] Disappointed voters and disempowered politicians clamor against the two-century-old system as an anti-democratic relic of institutionalized slavery. Too impatient to endure through the arduous process of amending the Constitution, several states and the District of Columbia have voted to join the National Popular Vote Interstate Compact. If the Compact goes into effect, they will give their own electoral votes to the candidate who wins a majority of the nationwide popular vote.[2] Not satisfied with leading by example, the drafters of the Compact purposefully crafted it so that it will take effect only if enough states join that the member states control 270 votes, the number a presidential candidate must obtain to win. Thus, the members could dictate that the winner of the nationwide popular vote would become president, even though the remaining states have not agreed to be governed in this manner, and the people of the member states have not agreed to forfeit their states' voice should they see things differently than the majority.

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    1.   *See infra* notes 58, 60 and accompanying text.

    2.   "[T]he National Popular Vote compact would require that each member state award its electoral votes to the presidential candidate who received the largest number of popular votes in all 50 states and the District of Columbia." JOHN R. KOZA ET AL., EVERY VOTE EQUAL 258 (2013), http://www.nationalpopularvote.com/sites/default/files/eve-4th-ed-ch6-web-v1.pdf [https://perma.cc/473Z-V7UC].

The irony that an initiative designed to right the supposed wrong that the Electoral College "takes the votes of the minority in individual states and awards those votes . . . to the candidate they opposed"[3] would itself do far worse by awarding all a state's votes to a candidate most of its own voters may have opposed, is exquisite. This Compact is an open attempt to subvert the constitutionally prescribed method of selecting the president by syphoning off the voting power of other states and aggrandizing it to the members. It is equally an assault on foundational principles of popular sovereignty in that each member would renege on its duty to its own people and cede their rightful choice to outsiders. Unsurprisingly, this perverse initiative is purely partisan in its inception,[4] but growing support for the Compact gives the debate over the continued validity of the Electoral College a new urgency.[5] The nebulous philosophical arguments and arcane statistical models that have historically characterized the debate are no longer enough.[6] Faced with

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3. Neal R. Peirce, *Foreword* to GEORGE C. EDWARDS III, WHY THE ELECTORAL COLLEGE IS BAD FOR AMERICA, at x (2004); *see also* EDWARDS at 36. Dr. Edwards is University Distinguished Professor Emeritus of Political Science and Jordan Chair in Presidential Studies at Texas A&M University.

4. Thus far, every one of the members is a solidly "blue state" that designated all its electoral votes to the Democratic candidate in both the 2000 and 2016 elections. (In 2016, member states Hawaii and Washington had a few "faithless electors" who cast a vote for a third-party candidate.) *Election for the Fifty-Eighth Term, 2017-2021*, U.S. ELECTORAL COLLEGE, https://www.archives.gov/federal-register/electoral-college/votes/2000_2005.html#2016 [https://perma.cc/J3AK-54GS]. The current members are California, Colorado, Connecticut, District of Columbia, Delaware, Hawaii, Illinois, Massachusetts, Maryland, New Jersey, New Mexico, New York, Oregon, Rhode Island, Vermont, and Washington. *Status of National Popular Vote Bill in Each State*, NATIONAL POPULAR VOTE!, https://www.nationalpopularvote.com/state-status [https://perma.cc/TX3F-CFZF]. In both elections, the Democratic candidate received more of the overall popular vote than the Republican. *See infra* notes 58, 60 and accompanying text.

5. According to National Popular Vote, Inc., the Compact has been introduced as a bill in every state. Since drafting of the article began in early 2019, Delaware has passed such a bill. Additionally, both chambers of Nevada's legislature voted in favor of entering the Compact; however, the governor vetoed the bill. *Status of National Popular Vote Bill in Each State*, *supra* note 4.

6. This article cannot conceivably address every argument that has been made for and against the Electoral College, nor is that its purpose. The author is convinced that such debate has reached an intellectual stalemate. There will always be little-d democrats and little-r republicans no matter what anyone says. Nevertheless, because this article purports to provide a new mathematical perspective, it is important to give prior scientific efforts due recognition. In general, opponents of the Electoral College disfavor it because they believe it violates the "one person, one vote" principle applicable in congressional elections. Williams v. Virginia State Bd. of Elections, 288 F. Supp. 622, 623–28 (E.D. Va. 1968), *aff'd*, 393 U.S. 320 (1969) (per curiam); William Josephson & Beverly J. Ross, *Repairing the Electoral College*, 22 J. LEGIS. 145, 161–66 (1996) (explaining that courts have declined to apply this principle to presidential elections). In effect, they argue, the Electoral College results in people from different states having different "voting power," thus violating the principle of political equality. These arguments appear to have their scholarly origins in the early work of John F. Banzhaf, III, creator of the "Banzhaf Index" and famous legal activist. *John F. Banzhaf, III*, GEO. WASH. L.,

reactionary efforts to undermine or discard the system, the nation needs more objective answers.

This article seeks to provide that objectivity. It answers three essential questions: what was the electoral system intended to do, what has it done, and what is the best (or worst) it can do?[7] It answers these questions using a unique approach that measures the electoral system's success and potential in terms that correspond to its *raison d'être*, parameterizing the problem in terms of satisfaction and population instead of voters. Also in contrast to traditional expositions, this article dispenses with "highly stylized"[8] and voter-based statistical models. It instead correctly recognizes the Electoral College as a discrete mathematical system and applies much simpler and more meaningful descriptive and predictive techniques to actual election data. The result is that the system's effect on elections is quantified, related to historical data, and reliably forecast for the foreseeable future. This is the type of substantive analysis long needed to confirm or disprove the system's merits.

Part I first examines records of the Constitutional Convention seeking to determine the Framers' purpose in choosing the algorithm they did. Concluding that their purpose was to provide a president who would be representative of people across the country, the article proceeds with a focus on *people* and *places* to examine whether the system has achieved its goal. Beginning with the first election in which there was a registered popular vote, Part II briefly describes the few discrepancies there have

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https://www.law.gwu.edu/john-f-banzhaf-iii [https://perma.cc/HGP8-W8H4]. *See,* John F. Banzhaf III, *One Man, 3.312 Votes: A Mathematical Analysis of the Electoral College*, 13 VILL. L. REV. 304 (1968); John F. Banzhaf III, *Weighted Voting Doesn't Work: A Mathematical Analysis*, 19 RUTGERS L. REV. 317 (1965). While such arguments sound persuasive to ears habituated to democratic rhetoric, they have a fatal flaw if taken as an evaluation of the Electoral College's merits. The principle of political equality is not violated unless one imposes the false premise that people are voting for the president. They are not. They are voting to direct their electors how to cast their votes. Political equality requires only that constituents of the same body politic have voting power equal to one another's. There is no requirement that individual constituents of different bodies politic have the same influence on extra-jurisdictional events.

    7.   Because almost all states have a "winner-take-all" approach to allocating their electoral votes and have almost since the beginning, Josephson & Ross*, supra* note 6, at 162, this article proceeds under the assumption that each state will cast all of its electoral votes for the same candidate. Presently, only Maine and Nebraska allow their electoral votes to be divided between candidates. *Frequently Asked Questions*, U.S. ELECTORAL COLLEGE, https://www.archives.gov/federal-register/electoral-college/faq.html [https://perma.cc/Z9JG-TLN5]. A few split votes have occurred in the past, Josephson & Ross*, supra* note 6, at 161, and a few "faithless electors," have caused a wrinkle. *See Faithless Electors*, FAIRVOTE, https://www.fairvote.org/faithless_electors [https://perma.cc/HH95-Y5LP].

    8.   Jonathan N. Katz et al., Empirically Evaluating the Electoral College 14 (Cal. Inst. of Tech., Working Paper No. 1134, 2002), https://authors.library.caltech.edu/79795/1/sswp1134.pdf [https://perma.cc/42H7-XXUV].

been between the popular and electoral vote in order to fairly characterize the basis for controversy. Its novel contribution, however, is to propose and apply a framework for assessing whether the Electoral College results in an effective expression of the will and interests of the People that is consistent with the legitimizing principles of our government. Part III concludes with a mathematical analysis that proves that there are specific, calculable limitations on the size and distribution of a prevailing minority and illustrates that there is a continuing likelihood that winning candidates will be selected by states comprising a majority of the population.

I.   THE ELECTORAL COLLEGE IS BORN

Records of the Constitutional Convention indicate that the delegates' most significant concern centered on separation of powers, specifically, ensuring that the president would be independent of the legislature (the most feared branch of government at the time). The pervasive sentiment was a desire to ensure that the executive would not be a political pawn[9] but a person of character and merit who would protect the interest of all the union. As this section will show, the delegates' views on what method of election would be most likely to produce an independent, upright president differed widely. After months of debate, however, the delegates had to acknowledge that no existing proposal adequately addressed their third and final goal; none was likely to consistently produce a president whom people across the country could accept. There was only one solution that addressed all their concerns and reconciled all their values: an electoral college.

The initial proposal, presented at the Convention on May 29, 1787 by Edmund Randolph (Va.), provided that the president would be selected by Congress.[10] Counterproposals were made by James Wilson (Pa.) and John Rutledge (S.C.).[11] Wilson was "in favor of an appointment by the people" and Rutledge suggested that the executive should be selected by the "second branch only of the national legislature."[12] Wilson refined his proposal the next day, then indicating that the purpose of his proposal was

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9.   *See* LAWRENCE D. LONGLEY & NEAL R. PEIRCE, THE ELECTORAL COLLEGE PRIMER 2000, 18–19 (1999) (pointing out that "there existed strong opposition to this plan on the grounds that this would make the chief executive subservient to Congress and unable to develop an independent leadership capacity").

10.   *Madison Debates, May 29*, THE AVALON PROJECT, https://avalon.law.yale.edu/ 18th_century/debates_529.asp [https://perma.cc/N6WN-F98Q].

11.   *Madison Debates, June 1*, THE AVALON PROJECT, https://avalon.law.yale.edu/ 18th_century/debates_601.asp [https://perma.cc/SJ7H-BUD6].

12.   *Id.* While the exact meaning of "second branch" is vague, it likely refers to the Senate.

to avoid state interference in the election and give people confidence in the "first magistrate."[13] Elbridge Gerry (Mass.) liked the idea in principle but was concerned about superseding state authorities.[14] He proposed using state-appointed electors as an alternative.[15] No one liked that idea, yet, and the delegates voted in favor of election by the legislature.[16] Mr. Gerry was not pleased, and a week later proposed that the executive be elected "by the Executives of the States whose proportion of votes should be the same with that allowed to the States in the election of the Senate."[17] Now Mr. Randolph was not pleased. Among a litany of other dreads, he objected that "[t]he confidence of the people would not be secured by it to the Nat[ional] magistrate. The small States would lose all chance of an appoint[ment] from within themselves."[18] Thus, as of June 13, the plan remained unchanged.[19] New Jersey's delegation thereafter introduced a plan that also provided for election by the legislature.[20]

It was Alexander Hamilton (N.Y.) who identified the most serious flaw in existing proposals and reintroduced the idea of using electors to resolve it.[21] "The great question is what provision shall we make for the happiness of our Country? . . . The [first] great [and] essential principle[] necessary for the support of Government [is] an active [and] constant interest in supporting it."[22] In order to ensure the success of the presidency—indeed, of the national government itself—it was critical to draw candidates "from the extremes to the center of the Community," chosen by a process that originated with the People.[23] Hamilton was concerned that no other plan would be ratified.[24] His recommendation was

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13. *Madison Debates, June 2*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_602.asp [https://perma.cc/U6E3-MMV7].

14. *Id.*

15. *Id.*

16. *Id.*

17. *Madison Debates, June 9*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_609.asp [https://perma.cc/9V6T-U6L5].

18. *Id.*

19. *Madison Debates, June 13*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_613.asp [https://perma.cc/3QXC-W2PV].

20. *Madison Debates, June 15*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_615.asp [https://perma.cc/9D8V-FEQA].

21. *Madison Debates, June 18*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_618.asp [https://perma.cc/KDG8-52E9].

22. *Id*.

23. *Id*. Hamilton's electors would have been chosen by the people directly.

24. *Id.*

not met with any enthusiasm, and the delegates again voted in favor of election by the legislature.[25]

Debate reopened on the subject a month later with Gouverneur Morris (N.Y.) calling for popular election.[26] Morris saw this as the best way to ensure that the president would "be the great protector of the Mass of the people."[27] Roger Sherman (Ct.) believed "that the sense of the Nation would be better expressed by the Legislature, than by the people at large."[28] Charles Pinkney (S.C.) was stunned that this was still an issue. Popular election was "liable to the most obvious [and] striking objections," he thought.[29] The people would "be led by a few active [and] designing men. The most populous States by combining in favor of the same individual will be able to carry their points."[30] And so on and on they went without resolution. Another motion was made in favor of using electors. It was defeated.[31]

Eventually, however, the delegates sensed opinion shifting toward "an election mediately or immediately by the people."[32] At this point, James Madison interjected his agreement that election by the legislature would violate essential principles of separation of powers.[33] He believed direct election by the People would "produce an Executive Magistrate of distinguished Character," as "[t]he people generally could only know [and] vote for some Citizen whose merits had rendered him an object of general attention [and] esteem," without making the president overly dependent on any other branch of the government. Madison recognized, however, that

> There was one difficulty . . . of a serious nature attending an immediate
> choice by the people. The right of suffrage was much more diffuse in
> the Northern than the Southern states; and the latter could have no
> influence in the election on the score of the Negros. The substitution of

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25. *Madison Debates, June 19*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_619.asp [https://perma.cc/JDC2-97AJ].

26. *Madison Debates, July 17*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_717.asp [https://perma.cc/N8HY-ZKXR].

27. *Madison Debates, July 19,* THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_719.asp [https://perma.cc/A6R8-NLFL].

28. *Madison Debates, July 17*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_717.asp [https://perma.cc/T7MF-JD3U]

29. *Id*.

30. *Id.*

31. *Id.*

32. *Madison Debates, July 19*, *supra* note 27.

33. *Id.*

electors obviated this difficulty and seemed on the whole liable to the fewest objections.[34]

Much has been made of this comment by those who insist the Electoral College exists solely because of slavery and is, therefore, outmoded.[35] It is notable that at the time Madison made this comment, no one had introduced any proposal regarding how to compute the number of electors to which each state would be entitled or determine their votes.[36] Madison lacked any specific information that could have caused him to believe the system would be sure to favor slaveholding states.[37] Furthermore, the two delegates who had proposed using electors were from states where slavery was widely disfavored and on the decline.[38]

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34.   *Id*.

35.   *See, e.g.*, Paul Finkelman, *The Proslavery Origins of the Electoral College*, 23 CARDOZO L. REV. 1145, 1147, 1155–57 (2002).

36.   A brief time afterward, Oliver Elseworth (Ct.) proposed a roughly proportional system that would have given one, two, or three electors to each state depending on population. *Madison Debates, July 19, supra* note 27.

37.   Remarkably, the Electoral College was never responsible for the election of a pro-slavery president against the popular will. Between 1828 and the adoption of the Thirteenth Amendment in 1865, there were no flipped elections. *See Historical Timeline*, 270TOWIN.COM, https://www.270towin.com/historical-presidential-elections/timeline/ [https://perma.cc/DV5P-SZWX]. Martin Van Buren (1836), Zachary Taylor (1848), James Buchanan (1856), and Abraham Lincoln (1860) received a plurality of popular votes and a majority of electoral votes. *Id*. Martin Van Buren, was opposed to slavery and ran as a third-party candidate with the Free Soil party in 1848. *Martin Van Buren [1782–1862]*, NEW NETHERLAND INSTITUTE, https://www.newnetherlandinstitute.org/history-and-heritage/dutch_americans/buren-martin-van/ [https://perma.cc/5DUM-3AVL]. Although a slave owner himself, Whig president Zachary Taylor vigorously opposed the expansion of slavery into new territories and was prepared to counter southern secession by force. *Zachary Taylor*, WHITEHOUSE.GOV, https://www.whitehouse.gov/about-the-white-house/presidents/zachary-taylor/ [https://perma.cc/9HDL-92MF]. James Buchanan's views on the issue were complex. *See* Donald V. Weatherman, *James Buchanan on Slavery and Secession*, 15 PRESIDENTIAL STUD. Q. 796 (1985) (discussing Buchanan's personal and political views on slavery). Of the four, he could most properly be classified as pro-slavery. His opponents in 1856 were the first-ever Republican presidential candidate John C. Frémont, recognized for his staunch anti-slavery views, and Vice President Millard Fillmore, who is possibly best known for his vigorous enforcement of the Fugitive Slave Act. *See* Zach Garrison, *Frémont, John C.*, CIV. WAR ON THE WESTERN BORDER: THE MO.-KAN. CONFLICT, 1855-1865, https://civilwaronthewesternborder.org/encyclopedia/frémont-john-c [https://perma.cc/L5AU-2AWK]; Michael Holt, *U.S. Presidents / Millard Fillmore*, U. VA. MILLER CTR., https://millercenter.org/president/fillmore [https://perma.cc/K9HX-VQ9F]. It is worth noting that a large majority of the popular vote went to the two slavery-friendly candidates. *Historical Timeline*, *supra*. In 1860, Abraham Lincoln was most closely followed in the vote count by the adamantly pro-slavery Stephen Douglas. Douglas suffered a humiliating defeat in the Electoral College while Lincoln walked away with a decisive victory. *Id*.

38.   Slavery lost legal protection in Massachusetts in 1781 when a series of lawsuits held that slavery was inconsistent with the Commonwealth's constitution. Rebecca Beatrice Brooks, *Slavery in Massachusetts*, HISTORY OF MASS. BLOG (Dec. 20, 2012), https://historyofmassachusetts.org/slavery-in-massachusetts/ [https://perma.cc/J6UD-ACP8]. New York had a long and complex relationship with slavery but had never been a plantation economy like the southern states. The

Thus, this particular comment does not strongly support the conclusion that pro-slavery sentiment was a primary motive force for adopting an electoral system.

The discussion of how to select the executive continued for several more days without progress. Questions of whether the president should be elected by the national legislature and whether a president should be eligible to hold office more than once were the almost exclusive subjects of debate during this period.[39] Other serious concerns included the possibility of foreign influence and a perceived preference for local candidates.[40] On July 25, Madison more fully expounded his view:

> The option . . . lay between an appointment by Electors chosen by the people-and an immediate appointment by the people. [Madison] thought the former mode free from many of the objections which had been urged ag[ain]st[] it, and greatly preferable to an appointment by the Nat[ional] Legislature. . . . This Mode however had been rejected so recently [and] by so great a majority that it probably would not be proposed anew. The remaining mode was an election by the people or rather by the qualified part of them, at large: With all its imperfections he liked this best. He would not repeat either the general argum[en]ts[] for or the objections ag[ain]st[] this mode. He would only take notice of two difficulties which he admitted to have weight. *The first arose from the disposition in the people to prefer a Citizen of their own State, and the disadvantage this [would] throw on the smaller States.* Great as this objection might be he did not think it equal to such as lay ag[ain]st[] every other mode which had been proposed. He thought too that some expedient might be hit upon that would obviate it. *The second difficulty arose from the disproportion of qualified voters in the N[orthern] [and] S[outhern]*

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abolitionist spirit was strong in the state even during the Revolutionary period, when Gouverneur Morris had proposed gradual abolition as a constitutional provision. *See generally* DAVID N. GELLMAN, EMANCIPATING NEW YORK, 1777-1827 (2006). Hamilton himself abhorred slavery and worked to end it in his state. *See, e.g.*, Ankeet Ball, *Ambition & Bondage: An Inquiry on Alexander Hamilton and Slavery*, COLUMBIA UNIVERSITY, https://columbiaandslavery.columbia.edu/content/ambition-bondage-inquiry-alexander-hamilton-and-slavery [https://perma.cc/6JY6-LH7K]; *see also* Michael D. Chan, *Alexander Hamilton on Slavery*, 66 REV. POL. 207 (2004). New York passed a gradual abolition law in 1799. *When Did Slavery End in New York State?* NEW YORK HISTORICAL SOCIETY, https://www.nyhistory.org/community/slavery-end-new-york-state [https://perma.cc/3CDP-C2VW].

39. *Madison Debates, July 20*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_720.asp [https://perma.cc/9GEC-SC33]; *Madison Debates, July 21*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_721.asp [https://perma.cc/KT2H-GH5Y]; *Madison Debates, July 23*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_723.asp [https://perma.cc/QWX4-HNMF]; *Madison Debates, July 24*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_724.asp [https://perma.cc/4HJN-K6TJ].

40. *Id*.

States, and the disadvantages which this mode would throw on the latter. The answer to this objection was 1. that this disproportion would be continually decreasing under the influence of the Republican laws introduced in the S[outhern] States, and the more rapid increase of their population. 2. That local considerations must give way to the general interest. *As an individual from the S[outhern] States he was willing to make the sacrifice.* [41]

In sum, Madison, a southerner, a slave holder, favored popular election even though it would theoretically make it less likely that a southerner would be elected president. Whether he believed it or not, he never expressed the opinion that an electoral system would be advantageous to the South or that it was necessary because of slavery. Madison's prediction that the southern states would eventually adopt "Republican laws," by which he presumably meant they would outlaw slavery and expand suffrage, reflects a presumption that helped convince many to ratify the constitution without solving the slavery problem.[42] But not all small-state delegates were satisfied with Madison's reasoning.[43] Oliver Ellsworth (Ct.), responded that the advantage direct election would give large states was an "unanswerable" problem, a non-starter in modern vernacular.[44] Thus, as of August 6, the proposed constitution still provided that "His Excellency" would be elected by Congress.[45]

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41. *Madison Debates, July 25*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_725.asp [https://perma.cc/3JHG-K5WJ] (emphasis added).

42. *See, e.g.*, *The Constitution and Slavery*, CONST. RTS. FOUND. (2019), http://www.crf-usa.org/black-history-month/the-constitution-and-slavery [https://perma.cc/2L7V-RN7Y] (explaining that "[m]ost [northern states] saw slavery as a dying institution with no economic future," a belief that proved inaccurate as a result of the invention of the cotton gin a few years later).

43. At least one credentialed author has asserted that "in all the debates over the executive at the Constitutional Convention, this issue [of placating small states] never came up." Finkelman, *supra* note 35, at 1150. Dr. Finkelman has a Ph.D. in history and is currently the president of Gratz College. *Paul Finkelman, Ph.D.*, GRATZ COLLEGE, https://www.gratz.edu/college-faculty-staff-executive-team/paul-finkelman-phd [https://perma.cc/GW66-LA23]. With all due respect to his academic accomplishments, his assertion is bewildering. The records of the Convention are riddled with concerns about ensuring meaningful small-state involvement in the presidential selection process, many of which are referenced in this article. It is true that "[n]o mention was made in the Convention records of the advantage given to the small states by giving all states two senatorial counterpart electors," but "James Madison did write later that the presidential election provisions were the 'result of compromise between the larger and smaller states, giving to the latter the advantage of selecting a President from the candidates, in consideration of the former in selecting the candidates from the people.'" Josephson & Ross, *supra* note 6, at 153.

44. *Madison Debates, July 25*, *supra* note 41. Connecticut had adopted a gradual abolition law in 1784. *See Slavery and Abolition*, CONNECTICUTHISTORY.ORG, https://connecticuthistory.org/topics-page/slavery-and-abolition/ [https://perma.cc/7CLK-88SQ].

45. The plan provided that
  [t]he Executive Power of the United States shall be vested in a single person. His stile shall
  be, "The President of the United States of America;" and his title shall be, "His

There was no more discussion of the mode of electing the president until September 4. On that day, Mr. Brearly reported a revision drafted by the committee to which the matter had been referred on August 31:[46]

> He shall hold his office during the term of four years, and together with the vice-President, chosen for the same term, be elected in the following manner, viz. Each State shall appoint in such manner as its Legislature may direct, a number of electors equal to the whole number of Senators and members of the House of Representatives to which the State may be entitled in the Legislature. 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 . . .[47]

A collective sigh must have erupted from certain quarters of the room. The notes record that "Mr. Randolph [and] Mr. Pinkney wished for a particular explanation [and] discussion of the reasons for changing the mode of electing the Executive." Morris responded with these specific reasons:

> The [first] was *the danger of intrigue [and] faction* if the appoint[ment] should be made by the Legislature. 2. [T]he inconveniency of an ineligibility required by that mode in order to lessen its evils. 3. The difficulty of establishing a Court of Impeachments, other than the Senate which would not be so proper for the trial nor the other branch for the impeachment of the President, if appointed by the Legislature, 4. *No body* [*sic*] *had appeared to be satisfied with an appointment by the Legislature*. 5. *Many were anxious even for an immediate choice by the people*. 6. [T]he indispensable necessity of *making the Executive independent* of the Legislature. As the Electors would vote at the same time throughout the U. S. and at so great a distance from each other, the great evil of cabal was avoided. It would be impossible also to corrupt them.[48]

The new proposal was a compromise, a fresh attempt to resolve the delegates' previously insurmountable concerns about ensuring executive independence and a sufficient popular mandate. It combined executive

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Excellency." He shall be elected by ballot by the Legislature. He shall hold his office during the term of seven years; but shall not be elected a second time.

Madison Debates, August 6, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_806.asp [https://perma.cc/E9G8-ADG2].

46. *Madison Debates, August 31*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_831.asp [https://perma.cc/ZA4P-3FTB]. *See* LONGLEY & PEIRCE, *supra* note 9, at 18.

47. *Madison Debates, September 4*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_904.asp [https://perma.cc/98XB-UVHD].

48. *Id*. (emphasis added).

independence and a degree of proportionality while still capturing the equal status of the states and the merits of popular election.[49] The delegates, hard to please as ever, continued to discuss concerns about "cabal and corruption," re-eligibility, and ensuring the independence and good character of the president, but they made no reference to slavery's impact or viability.[50] Notably, at no point did any delegate from a large state express the slightest concern that his state would be inadequately represented by this scheme.

After resolving how to conduct contingent elections, a matter which also entailed concerns about the influence of large states, the ideologues on both sides conceded. The next few days produced minor alterations to other sections, but there was again no further debate on how to elect the president. On September 17, the Convention approved a final draft providing for the Electoral College, as it would come to be known.[51] That plan was ultimately ratified by the States.[52] The essence of the electoral

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49. Award-winning author and political scientist Dr. Gary L. Gregg has summarized the compromise this way:

> The Electoral College was to be a method of electing the president that in many ways would closely resemble the constitutional system writ small. The selection of a good man to be president, it was hoped, would work similarly to the way good public policy was supposed to emerge from the political system—that is, through the efforts of the most qualified people working under conditions that would encourage mature discussions. In the case of the political system, the desired end was public policy that would not threaten the system or any one part of it and would further the national good. Likewise, it was hoped that the Electoral College would result in a president with the qualifications and interests necessary to serve the public well. Properly understood, the Electoral College and its origins point to the ideas and values that undergird the entire American constitutional system as these were embedded in the foundations of the Electoral College itself.

Gary L. Gregg II, *The Origins and Meaning of the Electoral College*, *in* SECURING DEMOCRACY: WHY WE HAVE AN ELECTORAL COLLEGE 1, 12 (Gary L. Gregg II ed., 2001).

50. *Madison Debates, September 4*, *supra* note 47; *Madison Debates, September 5*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_905.asp [https://perma.cc/6KDY-3H2F]; *Madison Debates, September 6*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_906.asp [https://perma.cc/Y7UA-EEJY].

51. *Madison Debates, September 17*, THE AVALON PROJECT, https://avalon.law.yale.edu/18th_century/debates_917.asp [https://perma.cc/QJ4V-4ZH5].

52. As ratified,

> The executive power shall be vested in a President of the United States of America. He shall hold his Office during the Term of four Years, and, together with the Vice President, chosen for the same Term, be elected, as follows
>
> 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.

system adopted in the Constitutional Convention survived subsequent amendments to Article II and remains today unaltered.[53]

This article has fairly described the process whereby the concept of an Electoral College came into being. It appears that no exacting mathematical standard was in play. The system was created to reconcile philosophical differences. The Framers were of one mind that the voice of the People was necessary, and ultimately decided that it could be best expressed through electors. As to the issue of motivation and political purpose, it is not the intention of this article to suggest that the Convention's implicit truce on slavery was not essential to the ultimate ratification of the Constitution, or that the fact of slavery's existence did not provide some impetus for the institution of the Electoral College. To do so would be untruthful. Equally untruthful, however, is the insinuation that these were the dominant considerations that undergird the system's design. Unfortunately, the Framers did not outlive the odious and embarrassing institution of slavery, and we do not have the benefit of their wisdom in an emancipated nation. We simply do not know what they would have done under different circumstances. But one thing is certain: they built the Constitution to last. The electoral system was designed to ensure that the president would be, as it is so often put nowadays, the President of all America.

Thankfully, our conception of what demographics constitute "all America" for political purposes has become much more defensible since that time. Melanin and chromosomes are no longer official metrics for rights and social status. As was so often the case, the Framers' goals, admirable in the abstract, were hindered and their solutions marred by the then-unavoidable presence of pervasive race- and sex-based oppression endemic to the culture of the time. But these crumbling obstacles should not obscure our vision of the Electoral College's potential. It is now positioned better than ever to achieve its essential and only valid purpose—to provide a President who would be representative of people across the country.[54]

U.S. CONST. art. II, § 1. *See also*, *Madison Debates, September 4*, *supra* note 47 (showing that the current language is substantially similar to the process recommended during the Constitutional Convention).

53.   By "essence" is meant the algorithm for computing the number of electors for each state. Of course, each of the original states has a different number of electors than at that time, states have changed how they select electors and assign votes, and the electors themselves go through a substantially different voting process.

54.   Many authors have argued that because the Framers never envisioned a winner-take-all system with bound electors in which Congress rarely plays a role in selecting the president, it has never functioned as it was meant to and for that reason belongs in the dustbin of history. *See, e.g.*,

II.   THE ELECTORAL COLLEGE MISBEHAVES?

Critics of the Electoral College allege that it has been "misbehaving" by producing outcomes that are inconsistent with the popular vote.[55] Five elections form the principle evidentiary basis for these complaints. Twice on the heels of the Civil War a United States presidential candidate who received a majority of the popular vote was defeated. In 1876, "one of the most hostile, controversial campaigns in American history" resulted in a one-vote victory for Rutherford B. Hayes.[56] In 1888, William Henry Harrison lost the popular vote by just half a percent.[57] In no other instance has a winner of a majority of the popular vote lost the election. Only two plurality vote-getters have lost because of the Electoral College. Half a percentage point separated the leading candidates in 2000.[58] That election spurred on the present antithetical movement.[59] Most recently in 2016, plurality winner Hillary Rodham Clinton faired two percent better at the polls than the ultimate winner, the characteristically provocative Donald Trump.[60] Trump's victory represents the biggest upset of the popular vote in the history of the country since the opposition's oldest exhibit: John Quincy Adams' defeat of Andrew Jackson in a contingent election.[61]

LONGLEY & PEIRCE, *supra* note 9, at 24–27; NEAL R. PIERCE, THE PEOPLE'S PRESIDENT: THE ELECTORAL COLLEGE IN AMERICAN HISTORY AND THE DIRECT-VOTE ALTERNATIVE 296–98 (1968). That argument is not quite right. The system operates within its original parameters. It does not do anything it did not originally have the capacity to do; in particular, it did not award all a state's electoral votes to the same person. Whether or not the Framers anticipated that metamorphosis, they intentionally gave states complete freedom in their choice of electors. It is no argument against the system that states figured out how to use it to maximize their influence.

55.   LONGLEY & PEIRCE, *supra* note 9, at 27.

56.   *Frequently Asked Questions on the 1876 Election*, RUTHERFORD B. HAYES PRESIDENTIAL LIBRARY & MUSEUMS, https://www.rbhayes.org/hayes/frequently-asked-questions-on-the-1876-election/ [https://perma.cc/5U42-YCLX]. A vote of 185-184 in the Electoral College made Hayes the winner over Samuel Tilden. Hayes received 48.4% of the popular vote. *1876 Presidential Election*, 270TOWIN, https://www.270towin.com/1876_Election/ [https://perma.cc/V4E4-38RB].

57.   Harrison won 233-168 but lost the nationwide popular vote by the narrowest of margins, carrying 49.6%. *1888 Presidential Election*, 270TOWIN, https://www.270towin.com/1888_Election/ [https://perma.cc/85W7-MT86].

58.   George W. Bush defeated Al Gore 271-266. Ralph Nader received no electoral votes. Bush carried 48.4% of the popular vote and Gore carried 48.9%. *2000 Presidential Election*, 270TOWIN, https://www.270towin.com/2000_Election/ [https://perma.cc/C3PT-WZ82].

59.   TARA ROSS, ENLIGHTENED DEMOCRACY: THE CASE FOR THE ELECTORAL COLLEGE 9 (2004). "Calls to abolish the Electoral College are not new," but many popular as well as scholarly objections are premised on fundamental misunderstandings. *Id.* at 5-10; *see infra* notes 90, 92.

60.   Trump defeated Clinton 304-227. Trump got 46.5% of the popular vote while Clinton garnered 48.6%. *2016 Presidential Election*, 270TOWIN, https://www.270towin.com/2016_Election/ [https://perma.cc/D2VA-C2Y6].

61.   No candidate received a majority of the electoral votes. Jackson garnered 99, Adams, 84, William Crawford, 41, and Henry Clay, 37. Jackson got more of the popular vote than Adams; 153,544 votes to Adams' 108,740. About 250,000 votes were cast "against" Adams. The choice

Historically, the main philosophical concern that has arisen out of these five incidents is that the Electoral College is anti-democratic. Essentially, the argument is that because the Electoral College does not produce results that satisfy the very specific ideal of complete consistency with a majority of equally weighted votes, the Electoral College is a bad thing.[62] In a sense, though, opponents of the Electoral College spend a great deal of brain power attempting to verify the self-evident: The Electoral College is not democratic. The Framers had no inkling that electoral votes would ever be credited on the basis of a popular vote or that states would almost uniformly adopt a winner-take-all approach. It is true that in its current form the system gives rise to the possibility that a minority of the population can control a majority of the electoral votes[63] and, as discussed above, that a majority of popular votes does not invariably equate to a majority of electoral votes and vice versa. Yet, as demonstrated below, these obnoxious idiosyncrasies have not defeated the valid purposes of the system.

A.   *Proposed Framework*

Indisputably, majority rule is an important principle. When it comes to the selection of lawmakers, it is the penultimate principle. With respect to the executive, however, our otherwise Lockean Framers did not consider it essential.[64] Other aspirations, including a need for national

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devolved on the House of Representatives, which selected Adams. *1824 Presidential Election*, 270TOWIN, https://www.270towin.com/1824_Election/ [https://perma.cc/L78W-9TXG] (last visited Apr. 1, 2019). Jackson won the popular vote and the electoral vote in the next election. *1828 Presidential Election*, 270TOWIN, https://www.270towin.com/1828_Election/ [https://perma.cc/GJL9-73J6].

62.   By succinctly characterizing the oppositional arguments this way, the author does not mean to imply that such arguments lack scholarly sophistication. The point is that the democratic ideal seems to be the Alpha and Omega of all opposition to the Electoral College.

63.   *See infra* Part III.

64.   Dr. Judith Best has ventured a plausible explanation of why a majority vote standard is not essential in the context of electing the president:

> The consent of the governed is a necessary condition in leadership selection, but that consent is not always identical to the consent of the arithmetical majority of the voters. The people's choice is not necessarily the majority-vote victor, if only because not all the people vote. And though we are making great strides to remedy the situation, not all the people who wish to vote can. Moreover, the plurality winner is not even the first choice of the majority of the voters. This is not to deny the legitimacy inherent in the majority principle, but only to indicate that it is a device which, in practice, operates imperfectly. . .

JUDITH BEST, THE CASE AGAINST DIRECT ELECTION OF THE PRESIDENT: A DEFENSE OF THE ELECTORAL COLLEGE 50 (3d ed. 1978). Dr. Best is currently a Distinguished Teacher of Political Science at SUNY Cortland. She received a Ph.D. in political science from Cornell University in 1971 and a Masters in English Literature from the University of Michigan in 1963 and has written dozens

unification around the president, predominated, though slightly.[65] The question is, does the Electoral College accomplish those predominating goals? Against the democratic ideal, supporters of the Electoral College have hitherto faithfully toed the Framers' line, insisting that the system gives people from small states a say and thus helps preserve the basis of union. As one author has pointed out, however, these weighty policy arguments have not been backed by data.[66] A new mathematical framework is needed to advance the discussion.

Data that would support the continuing validity of the Electoral College would demonstrate two things: the system achieves its purpose and the results it produces are consistent with legitimate governance. Every region's voice is being heard if every state's preferred candidate wins a substantial portion of the time. The electoral system is legitimate if it produces a sufficiently high rate of voter satisfaction to indicate that the People are being governed by consent. Historical state-by-state election results demonstrate that, over time, the Electoral College has satisfied both of these criteria.

## B.	Effective Expression Verified

Appendix I contains the data for this analysis. The information is based on election results by state since 1828.[67] The 1824 election has been disregarded because it was not decided by the Electoral College. Table 1 displays how many times each state has cast electoral votes for the winning presidential candidate during each of the following periods: 1828–2016, 1912–2016, and 1964–2016. The beginning date of each period corresponds to the first effective popular vote, the first election in which all forty-eight contiguous states voted (roughly the past century), and the first election in which all 50 states and the District of Columbia voted (reflecting current conditions), respectively. Table 2 shows the percentage of states that were on the winning side in each election year.

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of books and articles on the Electoral College as well as other constitutional topics. *Faculty/Staff Detail: Judith Best*, SUNY CORTLAND, http://www2.cortland.edu/departments/political-science/faculty-staff-detail.dot?fsid=314342 [https://perma.cc/RD3X-H3SY].

65.	It should be abundantly clear that the Framers did not intend to remove the voice of the People from the process, as some critics have asserted. *See* ROSS, *supra* note 59, at 41–42 (pointing out that even a Chief Justice of the United States Supreme Court has made this erroneous assertion). As Dr. Best has observed, that would not be a valid position to take. BEST, *supra* note 64, at 50–51.

66.	EDWARDS, *supra* note 3, at xvii. There have been some attempts to defend the Electoral College using statistical methods. *See, e.g.*, Katz et al., *supra* note 8.

67.	*Historical Election Results*, U.S. ELECTORAL COLLEGE, https://www.archives.gov/federal-register/electoral-college/votes/votes_by_state.html [https://perma.cc/T3RF-NHQ9].

Drawing on the information in these tables, it is possible to calculate the frequency with which the average state has cast its electoral votes for the candidate that ultimately won the election. That win rate is roughly equivalent to the frequency with which the candidate chosen by the majority of voters in an average state became president.[68] For each period, the average state's win rate is consistently just under seven wins per ten elections.[69] Equivalently, on average, a majority of voters in an average state is happy with the outcome of the election approximately 70% of the time. Furthermore, in only three elections has the prevailing candidate been selected by the vote of half the states or fewer.[70] Contrastingly, the average number of states on the winning side has been thirty. Since 1912, that number has been thirty-six and since 1964 it has been 35.5. Most impressively, every state has been on the winning side in at least half the elections in which it has participated.[71] This fact, together, with an overall high win rate, verifies the assertion that the constitutional system has protected the interests of all states and fostered amity within the Union.

Of course, these summary statistics represent only a correlation between the existence of the Electoral College and widespread satisfaction. They do not show that the Electoral College caused it, nor, standing alone, can they. Additional extensive studies might reveal whether the rates and distributions described above contrast with the historical popular vote, but any conclusions drawn therefrom concerning the relative merits of the system would be suspect, as it is not possible to say that the popular vote would have been the same under altered circumstances. Part III provides a basis for proving causation that requires no logically specious methods.

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68. For winner-take-all states, it is equivalent. There are a few instances in which a state has cast electoral votes for more than one candidate. *See supra* note 7. *See generally Historical Election Results*, *supra* note 67 (reporting the electoral votes of each state in each election).

69. The frequency is calculated by dividing the total number of states that cast their votes for the winner during that period divided by the corresponding number of opportunities to vote. Each state has one opportunity to vote in each election year. Thus, the number of opportunities each election year is equal to the number of states in the Union at that time. The number of opportunities over a period of time is the sum of the number of states in the Union each election year. (Note that no adjustment has been made for the fact that several states did not participate in 1864. Such an adjustment would raise the overall frequency by a few tenths of a percent). During any period in which the number of states did not vary, this frequency is simply the average number of times each state won divided by the number of elections. *See infra* Appendix I, Table 1.

70. In 1848, the votes of 15 of the 30 states placed Zachary Taylor in the White House. John F. Kennedy was elected in 1960 by the votes of only 23 of the 50 states. In 1976, Jimmy Carter received the electoral votes of 23 states and the District of Columbia. *See infra* Appendix I, Table 2.

71. The District of Columbia has been on the winning side in six out of the fourteen elections in which it has participated. *See infra* Appendix I, Table I.

III. THE ELECTORAL COLLEGE, MATURED

It has been shown that the vast preponderance of successful presidential candidates has had broad-based appeal. To this end, the Electoral College has occasionally sacrificed the preference of the majority as expressed by the popular vote. To reiterate, in only four of the nation's presidential elections has the candidate with the greatest number of popular votes lost due to the allocation of electoral votes. In two of those four, no one received a majority of the popular vote. It may reasonably be argued that this sacrifice is inappropriate in principle, but it cannot be intelligently argued that it is not worth it unless the severity of the risk can be quantified and contrasted with the magnitude of the benefit of the Electoral College.[72] Accordingly, this article now turns to provide a basis for that comparison.

A.   *The Senate Bump Quantified*

Disproportionality between the popular and electoral vote is mainly due to the two electoral votes every state receives in addition to those assigned to it based on its population. As it turns out, the "Senate bump" can be expressed both as a percentage that does not depend on population and as number of people that does.[73] It is possible to derive a formula indicating what portion of the population must live in a given number of states in order for those states, by voting together, to be assured victory in the Electoral College.[74] For simplicity, a subset of the states will be called a "*B* group."[75] There is a unique multiplier associated with each *B* group which, for brevity, this article will refer to as its "*b* coefficient."[76] This article focuses on validating the philosophical principles of the electoral

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72. Previous authors have recognized that it is probably not "sheer luck [that] has saved the nation from a series of runner-up presidencies" and identified facts and characteristics of the system that inductively support that conclusion, but they have not developed the mathematical formula to prove their reasonable inferences. *See* BEST, *supra* note 64, at 57–80.

73. It is important to note that the formulation in this section does not establish any boundaries as to what the popular vote count will look like. There is no guarantee that voter turnout rates will be uniform throughout the country or that the number of votes cast in each state will be proportional to its share of the overall population. If the appearance of things affects people's confidence in the system, this is a reasonable concern. High turnout across the nation would help minimize misleading disparities between the electoral vote and the popular vote and is desirable for that reason, among others.

74. Throughout, *population* refers to the population as of the census resulting in the apportionment in place at the time of the presidential election in question.

75. For reasons no better than that the author used the letter "B" to denote "big states" in the initial drafting phase.

76. A table listing all the *b* coefficients is provided in Appendix II.

system, and for that reason will provide an example calculating how many individuals must live in the "big states" in order for those states to be able to control more electoral votes than the remaining small states. This will enable a more objective evaluation of the system's fairness and make it possible to have an educated discussion about any adjustments that may need to occur. The formula, however, will work for any combination of states, as nothing about it depends on which states form the *B* group. For example, it could tell us how many people the census must identify in so-called blue states in order for Democratic victory in the next presidential election to be assured, or in red states in order for the Republican candidate to rest easy. In general, it can quantify how much more or less than 50% of the population it takes for any given voting bloc of states to prevail. That extra portion is the Senate bump quantified, and is calculable as the product of a *b* coefficient and the total population of the 50 states.

The formula's derivation has been provided in Appendix III.[77] For now, only three simple definitions are needed: P_B is the total population of the *B* group, *b* is the number of states in the *B* group, and *P* is the population of the 50 United States. A win in the Electoral College is guaranteed if *b* states that cast all their electoral votes for the same candidate had, at the time of apportionment, a total population of

$$\begin{cases} P_B > \frac{1}{2}P + \left(\frac{103-3b}{870}\right)P \text{ if D.C. votes against the B group, or} \\ P_B > \frac{1}{2}P + \left(\frac{97-3b}{870}\right)P \text{ if D.C. votes with the B group,} \end{cases}$$

Similarly, if *b* states have a population

$$\begin{cases} P_B < \frac{1}{2}P + \left(\frac{103-5b}{870}\right)P \text{ and D.C. votes against the } B \text{ group, or} \\ P_B < \frac{1}{2}P + \left(\frac{97-5b}{870}\right)P \text{ and D.C. votes with the } B \text{ group} \end{cases}$$

these states will not be able to win even if they cast all their electoral votes for the same candidate.

B. *Example*

As of the 2010 census, the total population of the 50 states was 308,143,815. Seventeen states had a population greater than the average.[78]

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77.   *See infra* Appendix III.

78.   *Resident Population Data*, UNITED STATES CENSUS 2010, https://web.archive.org/
web/20101225031104/http://2010.census.gov/2010census/data/apportionment-pop-text.php
[https://perma.cc/3UND-R5J6] (excluding the District of Columbia). *See infra* Appendix IV, Table I.

Together, they were home to some 70% of the U.S. population, about 216 million people. In fact, more than half the U.S. population lived in the largest ten.[79] The 17 form the *B* group for this example.[80] The formula tells us to what extent the Electoral College could have mitigated or suppressed these big states' influence.

Applying the formula, we can see that the answer is two-fold. First, the solution below shows that in order to control the 2012 election, those 17 states needed to be inhabited by just under 56% of the total U.S. population as of 2010:

$$\begin{cases} P_B > \frac{1}{2}P + \left(\frac{103-3\times17}{870}\right)P \cong \frac{1}{2}P + 0.060P = 154{,}071{,}908 + 18{,}417{,}719 = 172{,}489{,}699 \\ P_B > \frac{1}{2}P + \left(\frac{97-3\times17}{870}\right)P \cong \frac{1}{2}P + 0.053P = 154{,}071{,}908 + 16{,}292{,}661 = 170{,}364{,}569 \end{cases}$$

Thus, under the electoral system, in order to dictate the outcome of the presidential election of 2012, the big states needed to be home to 16.3–18.4 million extra residents (5.3–6.0% of the population) above and beyond what they would have needed in a popular vote system.

The second part of the answer is that the electoral system would not, in this scenario, have negatively impacted the big states' influence on the election. Their actual population dwarfed the Senate bump. Voting as a group, they could, despite the electoral system, have determined the outcome of the election without a single vote being cast in any other state.

C. *Systemic Boundaries*

The apparent ease with which heavily populated states can carry an election despite their constitutional handicap urges the question of just how much the Electoral College helps smaller states. After all, the nation did just experience one of the largest upsets in presidential politics in history, with President Trump receiving only 46.5% of the popular vote, so it must do something meaningful.[81] On that note, a few summary facts describe the entire objective basis for comfort or concern about the Electoral College:[82]

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79. *Id.*

80. This example works from the assumption that all 17 could have gone to the same candidate in order to simply and clearly illustrate the situation. In reality, not all 17 went to the same candidate.

81. *See*, *2016 Presidential Election, supra* note 60.

82. The tables in Appendix II contain values of every size *B* group. However, there are certain groups that are merely theoretical. For example, it is inconceivable that one or two states would ever contain half the population. In order to help the reader understand the foreseeable real-world *extrema* of the electoral system's influence, the following assumptions have been made: (1) Scenarios that require more than more than half the population to live in five or fewer states are unrealistic. (2)

1. Sixty percent of the population will always control 270 or more electoral votes.[83]
2. Any majority spread across 35 states, or 33 and the District of Columbia, will control 270 electoral votes.[84]
3. No minority smaller than 46% will ever be guaranteed 270 electoral votes.[85]
4. No minority that is spread across fewer than 35 states, or 33 and the District of Columbia, will ever be guaranteed to control 270 electoral votes.[86]
5. No minority can ever control 270 electoral votes unless it is spread across at least 21 states, or twenty if D.C. has the same presidential preference.[87]
6. A minority of about 40% distributed across approximately 40 states is the smallest that could conceivably control 270 electoral votes.[88]

D. *Consistent Performance Ensured*

Graphing the guaranteed and minimum win percentages versus the corresponding number of states provides a visual of what the Electoral College does:

Scenarios that imply over 60% of the population lives in fewer than ten states are unrealistic. These assumptions are made in light of the fact that in 2010, just over half the population lived in the largest ten states. It may be possible to refine these assumptions based on additional (past or future) census data. *See infra* Appendix IV.

83.   *See infra* Appendix II, Table 1.
84.   *Id*.
85.   *Id*.
86.   *See infra* Appendix II, Table 2.
87.   *See infra* Appendix II, Table 2 and note 87.
88.   *See infra* Appendix II, Table 2. For every *B* group, there is a range of populations between the figures corresponding to a guaranteed loss and guaranteed win that could, but do not necessarily, entitle the *B* group to 270 electoral votes. This is a purely theoretical problem that exists because we are dealing with generic groups of states. It is possible, as proven, to say what is the absolute minimum *B* group population that could ever control 270 electoral votes. To try to say more than that is not especially helpful. It suffices at present to say that small-minority and concentrated-minority win scenarios are incredibly unlikely to take place. *See infra* Appendix III, Chart 2.

Chart 1[89]
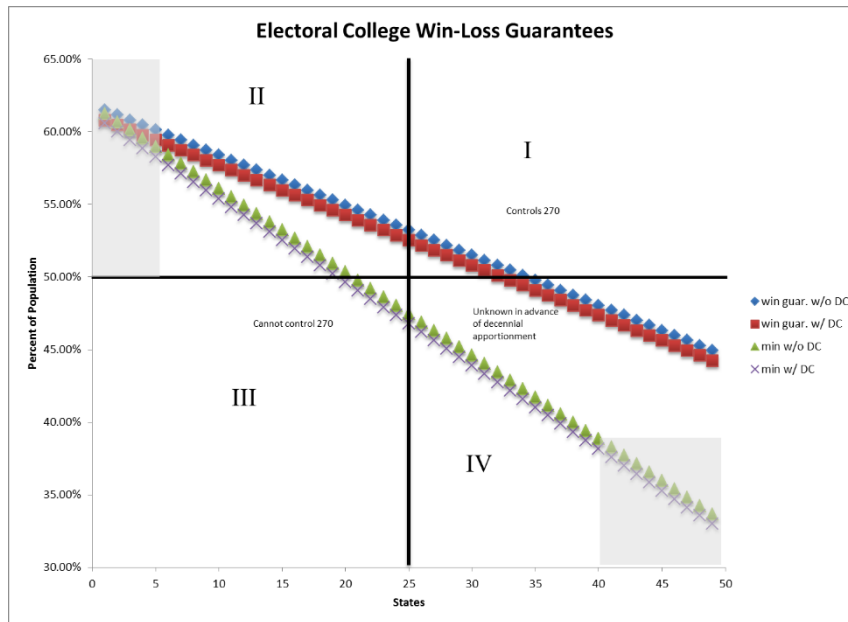
Region I: Widespread majorities
    Popular vote: *B* groups in this region could always win.
    Electoral vote: *B* groups in this region almost always control 270 electoral votes.
Region II: Concentrated majorities
    Popular vote: *B* groups in this region could always win.
    Electoral vote: *B* groups in the region usually control 270 electoral votes; small *B* groups with moderate majorities are disadvantaged.
Region III: Concentrated minorities
    Popular vote: *B* groups in this region never win unless voter turnout rates were lower in other states.
    Electoral vote: *B* groups in this region have almost no chance of controlling 270 electoral votes.
Region IV: Widespread minorities
    Popular vote: *B* groups in this region could never win unless voter turnout rates were lower in other states
    Electoral vote: There is a moderate chance that large *B* groups will control 270 electoral votes.

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    89.   A table listing all data for this chart is provided in Appendix II.

A *B* group will win if it falls above relevant guaranteed-win line and will lose if it falls below its minimum-win line. *B* groups that fall in the middle region might or might not control 270 electoral votes. This region is meaningful only to illustrate possible future scenarios. Once a census takes place and representation is apportioned for the ensuing ten years, there are no longer any theoretical *B* groups. A given subset of states either controls 270 votes during that period or it does not. The gray regions represent the unrealistic scenarios described in footnote 82.

Chart 1 shows in the abstract how the Electoral College skews win-loss potential. Chart 2 shows how it can impact real-life elections:

Chart 2[90]
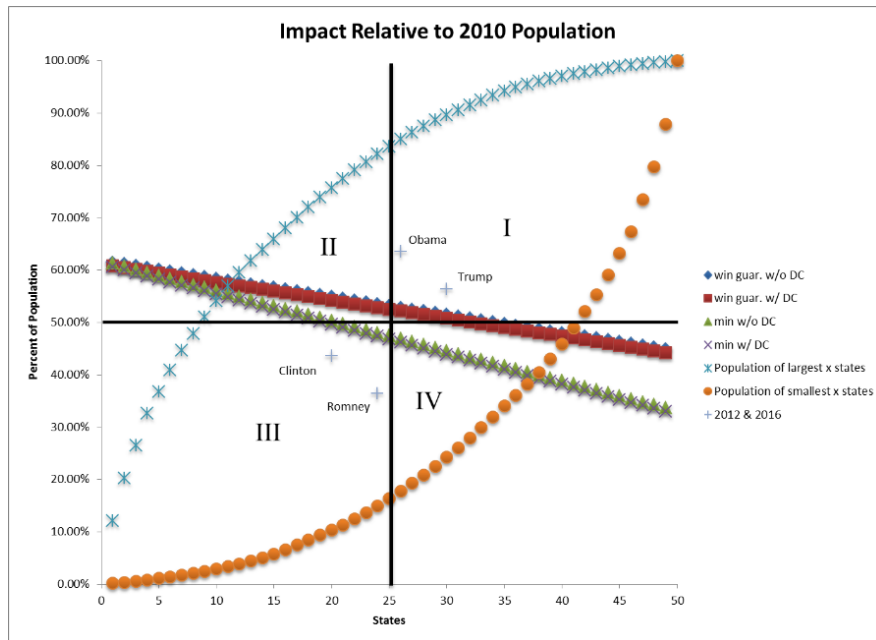
All real *B* groups exist on or between the two population curves. More data is needed to determine how consistently shaped the population curves are across time, but short of some catastrophic event, they will always look something like these. If population disparities become more extreme, the curvature will be more pronounced, and the significance of the Electoral College will be enhanced. If small states' populations grow

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90.   Tables listing all the data for this chart is provided in Appendices II, IV.

faster than large states, the curves will approach one another, minimizing the potential impact of the electoral system.

We can see that the impact of the Electoral College on widespread majorities, Region I, is near-negligible. Looking at Region II, we can see that the Electoral College makes only a small fraction of concentrated-majority win scenarios impossible and jeopardizes another small proportion. For example, the Electoral College presently eliminates the ability of the nine or ten largest states to control the election, but every other combination of the *b* largest states that would probably win under a popular vote system still can. In Region III, as in Region I, the Electoral College has little to no impact. Concentrated minorities have virtually no chance of prevailing, though that tiny triangular "possible" zone represents the extent to which the Electoral College favors large states. The Electoral College most significantly impacts Region IV, corresponding to widespread minorities. This confirms the position of those who say it generally favors small states. The Electoral College results in a handful of guaranteed wins and cognizable proportion of possible wins for *B* groups containing a large number of states and a large minority of the population.

These mathematically demonstrable bounds conclusively refute oppositional fears that it is by sheer coincidence the Electoral College has not frequently contradicted the voice of the People.[91] Moreover, they strongly indicate that the pattern observed in Part II, namely, that the Electoral College has produced broad-based consensus, will be perpetual. This is so because most winning scenarios require the candidate to appeal to a majority of the electorate *and* a large number of states. A candidate with a geographically concentrated base cannot win unless she is several percentage points more popular than the other candidate. A candidate who struggles in densely populated areas must compensate by attempting to convince a majority of the electorate in a substantial majority of states that he is the best choice. In a nutshell, the advantage, if any, of the electoral system over a popular vote is that the electoral system reduces the probability of geographically widespread dissatisfaction.

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91.   *See, e.g.*, LONGLEY & PEIRCE, *supra* note 9, at 38 ("It has been previously argued that the electoral college system has continued to exist for over two centuries through a combination of adaptation and chance. . . . In light of the number of hairbreadth elections . . . , that only two have produced an electoral college deadlock, and only two or three have resulted in an electoral college result other than for the popular vote leader, seems remarkable indeed.") It is remarkable, indeed, but because it is *not* the product of chance.

E. *Interpreting Results*

The Senate bump introduces a geographical component to the algorithm that prizes broad-based consensus.[92] For that reason, when a Trump-like win occurs, the 300+ electoral votes do not mean the result starkly contrasts with the will of the people. Interpreted properly, it reflects instead the distribution of different wills among the people.[93] If anything, it is the popular vote that is most liable to misrepresent the actual nationwide sentiment.[94] The Electoral College may have been created inartfully, but it has every mark of a master touch. It strikes a quintessentially American balance by recognizing that, when common values are held by individuals from across the country despite widely varying local interests, they should not always be shouted down by more numerous voices that express fewer perspectives. Yet, the republic is strongly democratic, and a minority must make a very strong showing in order to overcome. It must be a very large minority. It must demonstrate widespread concurrence. That is as it should be.

CONCLUSION

So what does all this mean? After all, isn't the Electoral College ultimately "a jerry-rigged improvisation which has subsequently been

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92. Majority here meaning a majority of the population, as throughout the article. There is no way to in a winner-takes-all electoral system to ensure that the electoral vote mirrors the actual popular vote in any particular election. In that respect, the Electoral College also compensates for conditions that may have affected voter turnout in a particular election. For example, California would still get its rightful proportion of influence even if it had experienced a catastrophic earthquake the day before the election.

93. *See generally,* JUDITH BEST, THE CASE AGAINST DIRECT ELECTION OF THE PRESIDENT: A DEFENSE OF THE ELECTORAL COLLEGE 206 (3d. ed. 1978) ("The electoral-count system magnifies the plurality winner's margin of victory unless his appeal is sectionally concentrated and thus ensures the victory of candidates with broad appeal.") Stunningly, it is not hard to find leading scholars of presidential politics who have ignored this fact and portrayed the Electoral College as a grossly imprecise system that fails to reflect the will of the electorate. *See, e.g.*, EDWARDS, *supra* note 3, at 41–44 (suggesting that the magnitude and frequency of disparities between the popular and electoral vote would be of only "marginal interest" except for the fact that "the candidate who receives the most votes loses"). In reality, the electoral vote is finely descriptive of what the nation thinks about a candidate.

94. For example, the proportion of the popular vote won by each major-party candidate in 2012 and 2016 was grossly disproportional to the relative population of the states that favored each. If we take the majority vote of the states that voted for each candidate as expressing the will of those states, both President Obama and President Trump were representative of a majority of the population. *Compare* Appendix IV, Table 3, *with supra* note 56. A discussion of the reasons for such a discrepancy is outside the scope of this article, but it must have something to do with inconsistent voter turnout rates. *See supra* note 72 (discussing the effect of high voter participation rates on the consistency of the electoral and popular vote).

endowed with a high theoretical content"?[95] No. Such dismissive interpretations ignore how long and hard the Framers labored over how to create a viable system consistent with core principles of popular governance. "The Electoral College is more than a hasty conclusion to a long summer in Philadelphia."[96] Moreover, the validity of the institution does not depend in the least whether it was Palladian in its conception, but rather on whether it has turned out to be a good thing. The Framers were engaged in a certain amount of speculation and theorizing, and were indeed tangled up in slavery's sticky web. Hindsight, though, fully vindicates their plan.

Though imperfect as every human effort, our Constitution has long been representative democracy's best friend. Every American has a stake in its preservation and betterment. Every member of the bar and every member of our government is its sworn defender. Change is sometimes necessary; intransigence is sometimes necessary. No one ought to be demonized for any well-meaning initiative on either side, but sheer recklessness must be called out. When it comes to efforts to reform or defend the Electoral College, this nation has been shooting in the dark. That must stop. Our leadership risks killing the very thing they must protect at all costs.

The Constitution's aspirational commitment to the rights and interests of every person in every part of its vast jurisdiction makes union sustainable. Perhaps more foundational than any other principle of our form of government, older even than the Constitution, is the right of every person to be governed by consent and not by the unconstrained will of others who cannot always have their best interests at heart.[97] Our predecessors concluded that neither a popular vote nor a proportional vote was the best way to further this principle. They instituted a surprisingly effective system that has consistently achieved their best goals. History has borne out that only rarely and by small margins does a minority prevail, and that a substantial majority of states generally agree on the best choice for president. Mathematics demonstrates that this is not a coincidence but a reflection of boundaries intrinsic to the constitutional algorithm. It assures us that minority victories will almost certainly continue to be rare and helps us accurately interpret margins of victory. If

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95. LONGLEY & PEIRCE, *supra* note 9, at 21.

96. ROSS, *supra* note 59, at 51.

97. *See, e.g.*, THE DECLARATION OF INDEPENDENCE para. 2 (U.S. 1776); ROSS, *supra* note 59, at 31–32 (recalling that the Framers knew from experience with Britain what it was like to be an ill-treated minority and purposefully structured the government as a whole to avoid "tyranny of the majority").

we now conclude that the Constitution has not struck the right balance between the rights of the majority and minority, large states and small states, urban areas and rural areas, or even between democracy and republicanism, then that should be corrected. But corrected is the key word. We must have informed confidence that what we do will make this Union more perfect. Only then can we make a responsible decision.

APPENDIX I[98]

Table 1 displays the number of times each state has voted for the winning presidential candidate in each of the indicated periods (beginning date through 2016). The "win rate" is the number of times a state has been on the winning side divided by the number of presidential elections that have occurred since it became eligible to participate. Table 2 shows the number of states that voted for the winning candidate in each presidential election 1828. Dividing this number by the number of states extant at the time gives us the percentage of states on the winning side.

Table 1

State	Wins since 1828	Wins since 1912	Wins since 1964	Win Rate
Alabama	25	15	8	0.521
Alaska	9	9	9	0.6
Arizona	21	21	9	0.778
Arkansas	26	19	11	0.565
California	35	21	10	0.833
Colorado	25	21	11	0.658
Connecticut	34	19	9	0.708
Delaware	32	21	11	0.667
DC	6	6	6	0.429
Florida	31	23	13	0.721
Georgia	25	16	8	0.521
Hawaii	9	9	8	0.6
Idaho	23	21	9	0.719
Illinois	40	22	10	0.833
Indiana	36	18	10	0.75
Iowa	32	20	11	0.744
Kansas	27	18	9	0.692
Kentucky	30	22	12	0.625
Louisiana	30	18	10	0.625
Maine	33	16	10	0.688
Maryland	33	21	9	0.688
Massachusetts	33	19	8	0.688
Michigan	35	19	10	0.761
Minnesota	29	18	7	0.725

98.   *Historical Election Results*, *supra* note 67.

Mississippi	24	14	8	0.5
Missouri	36	24	12	0.75
Montana	24	22	10	0.75
Nebraska	26	19	10	0.684
Nevada	31	25	12	0.795
New Hampshire	36	21	11	0.75
New Jersey	34	21	10	0.708
New Mexico	24	24	11	0.889
New York	38	20	9	0.792
North Carolina	31	20	11	0.646
North Dakota	23	18	9	0.719
Ohio	41	25	14	0.854
Oklahoma	20	20	9	0.714
Oregon	29	19	9	0.725
Pennsylvania	39	20	11	0.813
Rhode Island	34	19	8	0.708
South Carolina	25	16	9	0.521
South Dakota	20	17	10	0.625
Tennessee	31	23	12	0.646
Texas	23	19	8	0.535
Utah	23	20	9	0.742
Vermont	28	15	10	0.583
Virginia	29	20	10	0.604
Washington	22	19	8	0.688
West Virginia	30	21	9	0.769
Wisconsin	33	20	11	0.767
Wyoming	23	20	9	0.719

Table 2

Year	Winners	States*	%
1828	18	24	75.0%
1832	17	24	70.8%
1836	15	25	60.0%
1840	19	26	73.1%
1844	16	26	61.5%
1848	15	30	50.0%
1852	27	31	87.1%
1856	19	31	61.3%
1860	18	33	54.5%

1864	22	36	61.1%
1868	26	37	70.3%
1872	29	37	78.4%
1876	21	38	55.3%
1880	20	38	52.6%
1884	20	38	52.6%
1888	20	38	52.6%
1892	26	44	59.1%
1896	23	45	51.1%
1900	28	45	62.2%
1904	33	45	73.3%
1908	31	46	67.4%
1912	40	48	83.3%
1916	31	48	64.6%
1920	37	48	77.1%
1924	35	48	72.9%
1928	40	48	83.3%
1932	42	48	87.5%
1936	46	48	95.8%
1940	38	48	79.2%
1944	36	48	75.0%
1948	28	48	58.3%
1952	39	48	81.3%
1956	41	48	85.4%
1960	23	50	46.0%
1964	45	51	88.2%
1968	32	51	62.7%
1972	49	51	96.1%
1976	24	51	47.1%
1980	44	51	86.3%
1984	49	51	96.1%
1988	40	51	78.4%
1992	33	51	64.7%
1996	32	51	62.7%
2000	30	51	58.8%
2004	31	51	60.8%
2008	30	51	58.8%
2012	27	51	52.9%
2016	31	51	58.8%

*Includes DC starting in 1964.

APPENDIX II

The contents of Tables 1 and 2 are described in Part III. The light gray text at the beginning and end of each chart represents unrealistic scenarios. The gray highlighting indicates the inflection point at which states containing a minority of the population will win (Table 1) or could potentially win (Table 2). Note that the coefficients and percentages will remain the same following the 2020 census, but the size of the "bump" will change.

Table 1: Guaranteed Wins

b	b coefficient	"Bump" **	% of P	w/DC	"Bump" **	% of P
	without DC		Guarantees 270			
1	0.115	35,420,269	61.49%	0.108	33,295,053	60.80%
2	0.111	34,357,661	61.15%	0.105	32,232,445	60.46%
3	0.108	33,295,053	60.80%	0.101	31,169,836	60.11%
4	0.105	32,232,445	60.46%	0.098	30,107,228	59.77%
5	0.101	31,169,836	60.11%	0.094	29,044,620	59.43%
6	0.098	30,107,228	59.77%	0.091	27,982,012	59.08%
7	0.094	29,044,620	59.43%	0.087	26,919,404	58.74%
8	0.091	27,982,012	59.08%	0.084	25,856,796	58.39%
9	0.087	26,919,404	58.74%	0.080	24,794,188	58.05%
10	0.084	25,856,796	58.39%	0.077	23,731,580	57.70%
11	0.080	24,794,188	58.05%	0.074	22,668,972	57.36%
12	0.077	23,731,580	57.70%	0.070	21,606,364	57.01%
13	0.074	22,668,972	57.36%	0.067	20,543,756	56.67%
14	0.070	21,606,364	57.01%	0.063	19,481,148	56.32%
15	0.067	20,543,756	56.67%	0.060	18,418,540	55.98%
16	0.063	19,481,148	56.32%	0.056	17,355,932	55.63%
17	0.060	18,418,540	55.98%	0.053	16,293,324	55.29%
18	0.056	17,355,932	55.63%	0.049	15,230,716	54.94%
19	0.053	16,293,324	55.29%	0.046	14,168,107	54.60%
20	0.049	15,230,716	54.94%	0.043	13,105,499	54.25%
21	0.046	14,168,107	54.60%	0.039	12,042,891	53.91%
22	0.043	13,105,499	54.25%	0.036	10,980,283	53.56%
23	0.039	12,042,891	53.91%	0.032	9,917,675	53.22%
24	0.036	10,980,283	53.56%	0.029	8,855,067	52.87%
25	0.032	9,917,675	53.22%	0.025	7,792,459	52.53%
26	0.029	8,855,067	52.87%	0.022	6,729,851	52.18%
27	0.025	7,792,459	52.53%	0.018	5,667,243	51.84%
28	0.022	6,729,851	52.18%	0.015	4,604,635	51.49%
29	0.018	5,667,243	51.84%	0.011	3,542,027	51.15%
30	0.015	4,604,635	51.49%	0.008	2,479,419	50.80%
31	0.011	3,542,027	51.15%	0.005	1,416,811	50.46%
32	0.008	2,479,419	50.80%	0.001	354,203	50.11%
33	0.005	1,416,811	50.46%	-0.002	-708,405	49.77%
34	0.001	354,203	50.11%	-0.006	-1,771,013	49.43%
35	-0.002	-708,405	49.77%	-0.009	-2,833,621	49.08%
36	-0.006	-1,771,013	49.43%	-0.013	-3,896,230	48.74%
37	-0.009	-2,833,621	49.08%	-0.016	-4,958,838	48.39%
38	-0.013	-3,896,230	48.74%	-0.020	-6,021,446	48.05%

39	-0.016	-4,958,838	48.39%	-0.023	-7,084,054	47.70%
40	-0.020	-6,021,446	48.05%	-0.026	-8,146,662	47.36%
41	-0.023	-7,084,054	47.70%	-0.030	-9,209,270	47.01%
42	-0.026	-8,146,662	47.36%	-0.033	10,271,878	46.67%
43	-0.030	-9,209,270	47.01%	-0.037	11,334,486	46.32%
44	-0.033	-10,271,878	46.67%	-0.040	12,397,094	45.98%
45	-0.037	-11,334,486	46.32%	-0.044	-13,459,702	45.63%
46	-0.040	-12,397,094	45.98%	-0.047	-14,522,310	45.29%
47	-0.044	-13,459,702	45.63%	-0.051	-15,584,918	44.94%
48	-0.047	-14,522,310	45.29%	-0.054	-16,647,526	44.60%
49	-0.051	-15,584,918	44.94%	-0.057	-17,710,134	44.25%

**Population figures based on the 2010 census.[99]

Table 2: Guaranteed Losses

b	b coefficient w/o DC	"Bump"**	Min. to win	b coefficient w/ DC	"Bump"**	Min. to win
1	0.113	34,711,863	61.26%	0.106	32,586,647	60.57%
2	0.107	32,940,850	60.69%	0.100	30,815,634	60.00%
3	0.101	31,169,836	60.11%	0.094	29,044,620	59.43%
4	0.095	29,398,823	59.54%	0.089	27,273,607	58.85%
5	0.090	27,627,810	58.97%	0.083	25,502,593	58.28%
6	0.084	25,856,796	58.39%	0.077	23,731,580	57.70%
7	0.078	24,085,783	57.82%	0.071	21,960,567	57.13%
8	0.072	22,314,769	57.24%	0.067	20,189,553	56.55%
9	0.067	20,543,756	56.67%	0.060	18,418,540	55.98%
10	0.061	18,772,742	56.09%	0.054	16,647,526	55.40%
11	0.055	17,001,729	55.52%	0.048	14,876,513	54.83%
12	0.049	15,230,716	54.94%	0.043	13,105,499	54.25%
13	0.044	13,459,702	54.37%	0.037	11,334,486	53.68%
14	0.038	11,688,689	53.79%	0.031	9,563,473	53.10%
15	0.032	9,917,675	53.22%	0.025	7,792,459	52.53%
16	0.026	8,146,662	52.64%	0.020	6,021,446	51.95%
17	0.021	6,375,648	52.07%	0.014	4,250,432	51.38%
18	0.015	4,604,635	51.49%	0.008	2,479,419	50.80%
19	0.009	2,833,621	50.92%	0.002	708,405	50.23%
20	0.003	1,062,608	50.34%	-0.003	-1,062,608	49.66%
21	-0.002	-708,405	49.77%	-0.009	-2,833,621	49.08%
22	-0.008	-2,479,419	49.20%	-0.015	-4,604,635	48.51%
23	-0.014	-4,250,432	48.62%	-0.021	-6,375,648	47.93%

99.   *See* Resident Population Data, s*upra* note 78.

24	-0.020	-6,021,446	48.05%	-0.026	-8,146,662	47.36%
25	-0.025	-7,792,459	47.47%	-0.032	-9,917,675	46.78%
26	-0.031	-9,563,473	46.90%	-0.038	-11,688,689	46.21%
27	-0.037	-11,334,486	46.32%	-0.044	-13,459,702	45.63%
28	-0.043	-13,105,499	45.75%	-0.049	-15,230,716	45.06%
29	-0.048	-14,876,513	45.17%	-0.055	-17,001,729	44.48%
30	-0.054	-16,647,526	44.60%	-0.061	-18,772,742	43.91%
31	-0.060	-18,418,540	44.02%	-0.067	-20,543,756	43.33%
32	-0.066	-20,189,553	43.45%	-0.072	-22,314,769	42.76%
33	-0.071	-21,960,567	42.87%	-0.078	-24,085,783	42.18%
34	-0.077	-23,731,580	42.30%	-0.084	-25,856,796	41.61%
35	-0.083	-25,502,593	41.72%	-0.090	-27,627,810	41.03%
36	-0.089	-27,273,607	41.15%	-0.095	-29,398,823	40.46%
37	-0.094	-29,044,620	40.57%	-0.101	-31,169,836	39.89%
38	-0.100	-30,815,634	40.00%	-0.107	-32,940,850	39.31%
39	-0.106	-32,586,647	39.43%	-0.113	-34,711,863	38.74%
40	-0.111	-34,357,661	38.85%	-0.118	-36,482,877	38.16%
41	-0.117	-36,128,674	38.28%	-0.124	-38,253,890	37.59%
42	-0.123	-37,899,688	37.70%	-0.130	-40,024,904	37.01%
43	-0.129	-39,670,701	37.13%	-0.136	-41,795,917	36.44%
44	-0.134	-41,441,714	36.55%	-0.141	-43,566,931	35.86%
45	-0.140	-43,212,728	35.98%	-0.147	-45,337,944	35.29%
46	-0.146	-44,983,741	35.40%	-0.153	-47,108,957	34.71%
47	-0.152	-46,754,755	34.83%	-0.159	-48,879,971	34.14%
48	-0.157	-48,525,768	34.25%	-0.164	-50,650,984	33.56%
49	-0.163	-50,296,782	33.68%	-0.170	-52,421,998	32.99%

**Population figures based on the 2010 census.[100]

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100.   *Id*.

APPENDIX III

The formulas appearing in Part III may be derived in the following manner:

Let B be the number of electors from b states and L be the number of electors from the remaining states. The District of Columbia has three electors regardless of population. For all integers such that $1 \leq i \leq 50$, let P_i be the population of State i and P be the total population of the 50 states. Let R_i be the number of representatives to which State i is entitled. For all i, State i has $2 + R_i$ electors. $\sum_{i=1}^{50} R_i = 435$ by law and the District of Columbia has three electors regardless of population. Any b states can outvote the remaining states and D.C. if $B > L + 3$. If D.C. votes with the B group, then the B group can outvote the remaining states if $B + 3 > L$.

Because the disadvantage created by the electoral system is at its maximum when the B group does not include D.C., we will derive the formula only for that scenario and note that the derivation is identical for the other except that instead of $B > L + 3$ in the first step the derivation would begin with $B > L - 3$.

Let $B > L + 3$. Then

$$2b + \sum_{i=1}^{b} R_i > \left(2(50 - b) + \sum_{i=b+1}^{50} R_i \right) + 3$$

$$\Leftrightarrow 2b + \sum_{i=1}^{b} R_i > 2(50 - b) + 3 + 435 - \sum_{i=1}^{b} R_i$$

Because Congress has adopted proportional allocation, $R_i = \left[\frac{435}{P} P_i \right]$ where $f(x) = [x]$ is the Nearest Integer Function (that is, $[x]$ means x rounded to the nearest integer if x is not a whole number). Thus,

$$B > L + 3 \Leftrightarrow 2b + \sum_{i=1}^{b} \left[\frac{435}{P} P_i \right] > 2(50 - b) + 3 + 435 - \sum_{i=1}^{b} \left[\frac{435}{P} P_i \right]$$

$$\Leftrightarrow 2 \sum_{i=1}^{b} \left[\frac{435}{P} P_i \right] > 2(50 - b) + 3 + 435 - 2b$$

$$\Leftrightarrow 2 \sum_{i=1}^{b} \left[\frac{435}{P} P_i \right] > 538 - 4b$$

$$\Leftrightarrow \sum_{i=1}^{b} \left[\frac{435}{P} P_i \right] > 269 - 2b$$

(It may aid understanding to note that this last inequality is equivalent to saying it takes 270 electoral votes to win a presidential election). We want to be able to solve for $\sum_{i=1}^{b} P_i$ in order to determine a population figure that guarantees the B group can prevail in the presidential election. Unfortunately, we cannot solve the inequality directly because $[ax] \neq a[x]$ when a is not a whole number and $x \neq 0$. But the nearest integer function is bounded, so we know the largest and the smallest the left-hand expression can be. This means we can proceed. For any real number x, $x - \frac{1}{2} \leq [x] \leq x + \frac{1}{2}$. Hence, for any positive integer n, $\sum_{j=1}^{n}[x_j] \leq x_1 + \frac{1}{2} + x_2 + \frac{1}{2} + \ldots + x_n + \frac{1}{2} = \frac{n}{2} + \sum_{j=1}^{n} x_j$ and $\sum_{j=1}^{n}[x_j] \geq x_1 - \frac{1}{2} - x_2 - \frac{1}{2} - \ldots - x_n - \frac{1}{2} = -\frac{n}{2} + \sum_{j=1}^{n} x_j$. Thus,

$$\sum_{i=1}^{b}\left[\frac{435}{P}P_i\right] > 269 - 2b \Leftrightarrow -\frac{b}{2} + \sum_{i=1}^{b}\left(\frac{435}{P}P_i\right) < 269 - 2b < \frac{b}{2} + \sum_{i=1}^{b}\left(\frac{435}{P}P_i\right)$$

This last step enables us to factor the coefficient $435/P$ out of the sum. Now we can solve for $\sum_{i=1}^{b} P_i$ to determine a population figure that guarantees the B group can prevail in the presidential election. We are interested in the smallest population that will guarantee victory and the smallest population that could possibly control 270 electoral votes. Solving both sides, we see that

$$-\frac{b}{2} + \sum_{i=1}^{b}\left(\frac{435}{P}P_i\right) < 269 - 2b \Leftrightarrow \sum_{i=1}^{b}\left(\frac{435}{P}P_i\right) < 269 - 2b + \frac{b}{2}$$

$$\Leftrightarrow \frac{435}{P}\sum_{i=1}^{b} P_i < 269 - 2b + \frac{b}{2}$$

$$\Leftrightarrow \sum_{i=1}^{b} P_i < \frac{P}{435}\left(269 - 2b + \frac{b}{2}\right)$$

$$\Leftrightarrow \sum_{i=1}^{b} P_i < \frac{269P}{435} - \frac{2bP}{435} - \frac{bP}{870} = \frac{538P}{870} - \frac{3bP}{870}$$

and

$$\frac{b}{2} + \sum_{i=1}^{b}\left(\frac{435}{P}P_i\right) > 269 - 2b \Leftrightarrow \sum_{i=1}^{b}\left(\frac{435}{P}P_i\right) > 269 - 2b - \frac{b}{2}$$

$$\Leftrightarrow \frac{435}{P}\sum_{i=1}^{b} P_i > 269 - 2b - \frac{b}{2}$$

$$\Leftrightarrow \sum_{i=1}^{b} P_i > \frac{P}{435}\left(269 - 2b - \frac{b}{2}\right)$$

$$\Leftrightarrow \sum_{i=1}^{b} P_i > \frac{269P}{435} - \frac{2bP}{435} - \frac{bP}{870} = \frac{538P}{870} - \frac{5bP}{870}$$

The bigger of the two solutions will ensure that the B group wins. Thus, the B group is guaranteed to win if its population is $\frac{538P}{870} - \frac{3bP}{870}$ or greater. A B group cannot win if its total population is less than $\frac{538P}{870} - \frac{5bP}{870}$.

We can relate these numbers to a majority of the population by separating out $P/2$. The other addend will then be the maximum possible handicap created by the electoral system:

$$\sum_{i=1}^{b} P_i > \frac{538P}{870} - \frac{3bP}{870} = \frac{435P}{870} + \frac{103P}{870} - \frac{3bP}{870} = \frac{P}{2} + \left(\frac{103-3b}{870}\right)P$$

$$\sum_{i=1}^{b} P_i > \frac{538P}{870} - \frac{5bP}{870} = \frac{435P}{870} + \frac{103P}{870} - \frac{5bP}{870} = \frac{P}{2} + \left(\frac{103-5b}{870}\right)P$$

This means that the B group is guaranteed to win if its population exceeds 50% of the total U.S. population by $\left(\frac{103-3b}{870}\right)P$. Note that this "excess" is negative if and only if $b > 34$. No b states with a total population that falls short of a majority by more than $\left(\frac{103-5b}{870}\right)P$ can ever win.

APPENDIX IV – CHART DATA

Table 1

Rank	State	2010 Population[101]	% of total	b largest
1	California	37,253,956	12.1%	12.1%
2	Texas	25,145,561	8.2%	20.3%
3	New York	19,378,102	6.3%	26.5%
4	Florida	18,801,310	6.1%	32.6%
5	Illinois	12,830,632	4.2%	36.8%
6	Pennsylvania	12,702,379	4.1%	40.9%
7	Ohio	11,536,504	3.7%	44.7%
8	Michigan	9,883,640	3.2%	47.9%
9	Georgia	9,687,653	3.1%	51.0%
10	North Carolina	9,535,483	3.1%	54.1%
11	New Jersey	8,791,894	2.9%	57.0%
12	Virginia	8,001,024	2.6%	59.6%
13	Washington	6,724,540	2.2%	61.7%
14	Massachusetts	6,547,629	2.1%	63.9%
15	Indiana	6,483,802	2.1%	66.0%
16	Arizona	6,392,017	2.1%	68.1%
17	Tennessee	6,346,105	2.1%	70.1%
18	Missouri	5,988,927	1.9%	72.1%
19	Maryland	5,773,552	1.9%	73.9%
20	Wisconsin	5,686,986	1.8%	75.8%
21	Minnesota	5,303,925	1.7%	77.5%
22	Colorado	5,029,196	1.6%	79.1%
23	Alabama	4,779,736	1.6%	80.7%
24	South Carolina	4,625,364	1.5%	82.2%
25	Louisiana	4,533,372	1.5%	83.7%
26	Kentucky	4,339,367	1.4%	85.1%
27	Oregon	3,831,074	1.2%	86.3%
28	Oklahoma	3,751,351	1.2%	87.5%
29	Connecticut	3,574,097	1.2%	88.7%
30	Iowa	3,046,355	1.0%	89.7%
31	Mississippi	2,967,297	1.0%	90.6%
32	Arkansas	2,915,918	0.9%	91.6%
33	Kansas	2,853,118	0.9%	92.5%
34	Utah	2,763,885	0.9%	93.4%

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101. *Id.*

35	Nevada	2,700,551	0.9%	94.3%
36	New Mexico	2,059,179	0.7%	94.9%
37	West Virginia	1,852,994	0.6%	95.5%
38	Nebraska	1,826,341	0.6%	96.1%
39	Idaho	1,567,582	0.5%	96.6%
40	Hawaii	1,360,301	0.4%	97.1%
41	Maine	1,328,361	0.4%	97.5%
42	New Hampshire	1,316,470	0.4%	97.9%
43	Rhode Island	1,052,567	0.3%	98.3%
44	Montana	989,415	0.3%	98.6%
45	Delaware	897,934	0.3%	98.9%
46	South Dakota	814,180	0.3%	99.2%
47	Alaska	710,231	0.2%	99.4%
48	North Dakota	672,591	0.2%	99.6%
49	Vermont	625,741	0.2%	99.8%
50	Wyoming	563,626	0.2%	100.0%
Total		308,143,815	100.0%	

Table 2

Rank	State	2010 Population[102]	% of total	b smallest
50	Wyoming	563,626	0.2%	0.2%
49	Vermont	625,741	0.2%	0.4%
48	North Dakota	672,591	0.2%	0.6%
47	Alaska	710,231	0.2%	0.8%
46	South Dakota	814,180	0.3%	1.1%
45	Delaware	897,934	0.3%	1.4%
44	Montana	989,415	0.3%	1.7%
43	Rhode Island	1,052,567	0.3%	2.1%
42	New Hampshire	1,316,470	0.4%	2.5%
41	Maine	1,328,361	0.4%	2.9%
40	Hawaii	1,360,301	0.4%	3.4%
39	Idaho	1,567,582	0.5%	3.9%
38	Nebraska	1,826,341	0.6%	4.5%
37	West Virginia	1,852,994	0.6%	5.1%
36	New Mexico	2,059,179	0.7%	5.7%
35	Nevada	2,700,551	0.9%	6.6%
34	Utah	2,763,885	0.9%	7.5%
33	Kansas	2,853,118	0.9%	8.4%

102. *Id*.

32	Arkansas	2,915,918	0.9%	9.4%
31	Mississippi	2,967,297	1.0%	10.3%
30	Iowa	3,046,355	1.0%	11.3%
29	Connecticut	3,574,097	1.2%	12.5%
28	Oklahoma	3,751,351	1.2%	13.7%
27	Oregon	3,831,074	1.2%	14.9%
26	Kentucky	4,339,367	1.4%	16.3%
25	Louisiana	4,533,372	1.5%	17.8%
24	South Carolina	4,625,364	1.5%	19.3%
23	Alabama	4,779,736	1.6%	20.9%
22	Colorado	5,029,196	1.6%	22.5%
21	Minnesota	5,303,925	1.7%	24.2%
20	Wisconsin	5,686,986	1.8%	26.1%
19	Maryland	5,773,552	1.9%	27.9%
18	Missouri	5,988,927	1.9%	29.9%
17	Tennessee	6,346,105	2.1%	31.9%
16	Arizona	6,392,017	2.1%	34.0%
15	Indiana	6,483,802	2.1%	36.1%
14	Massachusetts	6,547,629	2.1%	38.3%
13	Washington	6,724,540	2.2%	40.4%
12	Virginia	8,001,024	2.6%	43.0%
11	New Jersey	8,791,894	2.9%	45.9%
10	North Carolina	9,535,483	3.1%	49.0%
9	Georgia	9,687,653	3.1%	52.1%
8	Michigan	9,883,640	3.2%	55.3%
7	Ohio	11,536,504	3.7%	59.1%
6	Pennsylvania	12,702,379	4.1%	63.2%
5	Illinois	12,830,632	4.2%	67.4%
4	Florida	18,801,310	6.1%	73.5%
3	New York	19,378,102	6.3%	79.7%
2	Texas	25,145,561	8.2%	87.9%
1	California	37,253,956	12.1%	100.0%
Total		308,143,815	100.0%	

Table 3[103]

	States won	% of population represented
Obama	26	63.6%
Romney	24	36.4%
Clinton	20	43.6%
Trump	30	56.4%

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103.   *See*, *2016 Presidential Election, supra* note 60.