

Electoral College and Election Fraud*

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Abstract

One frequently overlooked aspect of the U.S.-style electoral college system is that it discourages election fraud. In a presidential election based on popular vote, competing parties are motivated to manipulate votes in areas where they have the most significant influence, such as states where they control local executive offices, legislatures, and the judiciary. With the electoral college, the incentives for fraud shift to swing states where the local government is politically divided, and fraud is therefore more difficult and riskier. An increase in polarization makes fraud more likely but does not affect the fraud-protection advantage of the electoral college. Similarly, the single-member district electoral system provides better protection against election fraud than proportional representation.

Keywords: electoral college, election fraud, popular vote, single-member districts, proportional representation.

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The fact that the United States, a country with a long history of uninterrupted elections under the same fundamental rules, does not elect its president through a popular vote is a constant source of public amusement and intense debate. According to a survey conducted by the Pew Research Center in January 2021, 55 percent of Americans favor electing the president based on the popular vote, while only 43 percent support the current system of the electoral college¹. Even prior to the controversial 2016 and 2020 elections, headlines such as “How to Get Rid of the Electoral College” have been pervasive.² Since the adoption of the U.S. Constitution in 1787, there have been more than 700 congressional proposals aimed at reforming or repealing it (Strömberg, 2008). Notably, the issue of election fraud rarely features prominently in these discussions.

In this paper, we argue that the current US system creates strong disincentives for American national parties to engage in various forms of electoral manipulation.³ This, in turn, might be an explanation why discussions about the merits of the electoral college often neglect this issue: the protection it offers is so strong that election fraud has not been a big issue in American elections throughout history. (In what follows, we briefly discuss exceptions to this general pattern and the history of election fraud in other countries.)

Under the electoral college, presidential candidates compete for votes state-by-state. The winner of each state obtains all the state’s electoral votes, the number of which is equal to the size of the state’s congressional delegation, which, in turn, is roughly aligned with the state’s population.⁴ This system often results in very close elections in a select

¹“Majority of Americans continue to favor moving away from Electoral College”, *Pew Research Center*.

²“How to get rid of the Electoral College”, *Brookings Institute*. See Schumaker and Loomis (2002) for a variety of perspectives on the contentious outcome of the 2000 presidential election (also, Wand et al., 2001, and Mebane, 2004).

³Election fraud typically includes a variety of illegal actions aimed at changing the results of an election. However, our logic applies more broadly, including some actions that are legal such as parties that control local governments choosing locations and hours of polling stations, or changing voter ID laws, or otherwise manipulating voter rolls with the goal of increasing the turnout of supporters and depressing the turnout of political opponents.

⁴This is a simplification of the actual process in the U.S. As the number of electoral votes for each state is equal to the number of representatives of this state in the House, which is formed basing on proportional representation, plus two (the number of the state’s Senators), the less populous states are over-

few states. In the 2020 presidential election, for example, incumbent President Trump faced losses of 10 thousand votes (0.3 percent) in Arizona, 12 thousand votes (0.2 percent) in Georgia, and 20 thousand votes (0.6 percent) in Wisconsin. Similarly, in 2016, Hillary Clinton experienced a combined margin of defeat of 76 thousand votes in three swing states; in 2024, a change of 115,000 votes would be sufficient to swing the electoral college into the losing candidate's favor. A superficial analysis would suggest that the relatively small degree of fraud required to overturn the election in either case could present a significant opportunity, if not a temptation, to engage in such activities.

The contribution of this paper is to consider the critical point – that under the electoral college (or under majoritarian electoral system in a parliamentary republic), the states where fraudulent votes would be most valuable are also the states where it would be most difficult to obtain them – in a general equilibrium setup. Consider hypothetically what President Trump would need to do in order to change the outcome of the election he lost in 2020. In the states that he lost closely – Arizona, Wisconsin, and Georgia – his opponents had a significant representation at all levels of government such as the state Supreme Courts, the lower and upper chambers of the state legislatures, and the states' congressional delegations. Thus, organizing fraud sufficient to swing the outcome in these states with the expectation that election supervisors, prosecutors, and judges would turn a blind eye would be extremely challenging. At the same time, it would be comparatively easier to obtain a substantial number of fraudulent votes in Republican-dominated states such as Tennessee, Texas, Alabama, or Oklahoma, where President Trump won by significant margins and enjoyed widespread support at all levels of government. However, while it may be easier to steal votes in any of the former states, it would be pointless under the electoral college system.⁵ In contrast, under the popular

represented. Two states, Maine and Nevada, do not use the winner-take-all system to allocate their electoral votes.

⁵In 2020, Trump lost by 10,000 votes (0.3 percent) in Arizona, 12,000 votes (0.2 percent) in Georgia, and 20,000 votes (0.6 percent) in Wisconsin. Meanwhile, Trump won by 708,000 votes in Tennessee, 631,000 votes in Texas, and 591,000 votes in Alabama. The “excess” votes from each of these states would have been sufficient to win if they were “transferred” to states that Trump lost. In 2016, Hillary Clinton lost by

vote system, a vote in Tennessee would hold the same value as a vote in Wisconsin.

We elaborate on this intuition in a simple example, which uses the partial equilibrium logic and does not extend to a general case in any straightforward way, and then present a general equilibrium model. It is a remarkable technical challenge, as Colonel-Blotto-type contests are notoriously difficult to analyze from the perspective of comparative statics (Borel, 1953; Blackett, 1958; Konrad and Kovenock, 2009). The problem is that in a game of two players allocating resources across many battlefields, the allocation of resources by one side affects the marginal benefits of allocating resources by the other side non-monotonically (Roberson and Kvasov, 2012; Kovenock and Roberson, 2012). In the context of election manipulation, when one party pours resources into a state, it simultaneously makes the other party more willing to pour resources into the same state (to defend its prospect of victory) and to other states as these states become easier to win (as the opponent redistributed resources away); the balancing effect is hard to pin down.

Our model is a game of two parties that allocate resources across states after citizens have cast their votes. Spending money in a state allows either party to turn a certain share of votes there; the more money is spent, the larger is the swing. However, stealing votes is increasingly difficult in an unfriendly environment, where poll workers, law enforcement, and local governments would not look the other way when they suspect fraud. To simplify exposition, we model this as a hard constraint, namely that only a certain share of votes may be stolen in each state, and this share is higher for Republicans in more Republican-leaning states and higher for Democrats in more Democratic-leaning ones. Since states are heterogeneous with a different share of Republicans and Democrats, it is possible that once the national election shock has been realized, there are not enough votes for a party to overturn the election in a specific state, even if the party may be able to get enough votes in other states and has ample budget to do so.

combined margin 76,000 votes in the three swing states; her popular vote margin was 2,865,000. In fact, in most modern elections the votes won by the losing candidate in “their” states would have been sufficient to overturn the result if they were cast in pivotal states instead.

To make our theoretical argument transparent, we assume that the political space is symmetric and that the number of jurisdictions and individuals living in those jurisdictions is large but finite. Thus, the Nash theorem guarantees the existence of an equilibrium. Furthermore, we demonstrate that if there is an equilibrium that involves no fraud, it is a unique equilibrium. Then we investigate the conditions under which a no-fraud Nash equilibrium exists under either of the electoral systems. To simplify formulas even more, when making comparisons, we make use of a continuous approximation; the advantage of this approach is also that it makes the problem of unequal sizes of jurisdictions moot. This results in a “minimalist” model that allows us to focus on fraud rather than other well-studied consequences of electoral college, such as pivotality and minority representation (Shapley and Shubik, 1954; Uslander, 1976; Strömberg, 2008; Wright, 2009).

When is election fraud more likely to happen? Not surprisingly, one such case is when elections are very close (Hasen, 2020). Such fraud may not be consequential as close elections necessarily involve a high degree of randomness (Eggers et al., 2015), with the outcome affected by, e.g., the weather on election day (Shachar and Nalebuff, 1999; Gomez, Hansford and Krause, 2007; Fowler, 2015).⁶ At the other extreme, landslide elections such as 1964 or 1984 presidential races in the U.S. are next to impossible to defraud. We measure resilience of the electoral system to fraud by how far apart the fair vote tallies of the two parties have to be in order to sustain the equilibrium without fraud. In other words, we ask the following question: How big should the difference in votes be to make *not* committing fraud a Nash equilibrium, and how does this threshold depend on the electoral system?

Our answer is as follows. Under mild assumptions, *the threshold that prevents fraud under the electoral college system is lower than under the popular vote*. These thresholds

⁶Using most popular probabilistic models of the US presidential elections, Geruso and Spears (2024) find that the electoral college system tends to produce more close outcomes than the popular vote system. Relatedly, Geruso, Spears and Talesara (2022) show that *inversions*, when the outcome of the popular vote is different from that of the electoral college, is a relatively likely outcome rather than a statistical fluke.

are determined from two constraints that each party that seeks to change the outcome of the election by the means of fraud must overcome. First, there should be enough votes to steal; this is what we call *feasibility constraint*. Second, the overall cost of the process, real or reputational, should not exceed the amount of resources the party has, giving rise to *budget constraint*. We show that on the margin, that is, when the society is just indifferent between the electoral college and the popular vote system, the two active constraints are the feasibility constraint of the electoral college system and the budget constraint of the popular vote system. This result allows us to address potentially complex questions, such as the consequences of polarization, in a tractable way. We show that an increase in polarization (within or between states) does not change which electoral system deters fraud more reliably, nor does it hurt the optimal system's ability to deter fraud – but, interestingly, it makes whichever system is the worst even worse.

Our conclusion about the superior resilience of the electoral college to fraud is not without reservations. In fact, our theory delineates conditions where the opposite would be true, i.e., the popular vote provides greater deterrence. Essentially, this opposite conclusion would be reached if the budget constraint is binding but the feasibility constraint is not – votes are there to steal, but parties lack resources to organize fraud. Our interpretation of this result is that the electoral college's weaknesses would show in weakly institutionalized environments. In contrast, in countries where parties have ample resources but the amount of votes that can be stolen is relatively small, the electoral college would be superior.

One critical assumption we make is that under both systems, instances of fraud are checked by local authorities, regulators, and courts. This is natural given the way the electoral system works in the United States at present. One suggested replacement, the Interstate Compact of the National Popular Vote, would also retain local counting and enforcement even while implementing the popular vote (see the discussion below). We focus exclusively on such situations. We do not consider the possibility of conducting the

election by a powerful national election commission, as is done in some countries. Our model implies that implementing the popular vote system while continuing to enforce vote integrity locally is inferior to the current system. If counting votes for the popular vote is left to states, the incentives to steal votes in the one-party-dominated states is at the maximum. Thus, our model argues that switching to the popular vote will necessitate creating a new national body with significant powers. (In fact, these powers will be unprecedentedly strong as no mature democracy elects a president with such vast powers as the U.S. president.) Currently, most election fraud cases are being resolved by courts from the district to the state level. With a national election commission, the main area of legal fights will be higher courts. Our argument shows that the Interstate Compact will significantly increase the role of the U.S. Supreme Court in the routine political process.

The literature on electoral college is both vast and limited. Primary criticisms of the electoral college include claims that it produces results that significantly deviate from that of the popular vote (Hinich and Ordeshook, 1974; Abbott and Levine, 1991; Strömberg, 2008; Hummel, 2011), reduces or skews voters' power (Banzhaf III, 1965; Mann and Shapley, 1964; Gelman and Katz, 2001; Gelman, Silver and Edlin, 2012), and unfairly empowers certain groups over others (Uslaner, 1976; Nelson, 1974). In one of the first positive models of campaign resource allocation, Brams and Davis (1974) predicted that candidates should allocate resources in proportion to about $3/2$'s of the power of the electoral votes in each state. Strömberg (2008), a probabilistic model of campaign resource allocation, finds similar results by comparing the predictions of the model to the number of campaign visits by state.

In the political science literature, different aspects of the electoral college have been extensively discussed, including those that we investigate. The issue of election fraud in the context of electoral college has popped up before, e.g., in Adkison and Elliott (1997) or, in a legal context, in Florey (2017). However, in the absence of an appropriate model, an argument might be lacking in logical consistency. For example, Best (1975) argued

that while the electoral college restricts the effects of fraud to individual states, in which fraud may be too insignificant to matter, the popular vote may see the temptation to commit fraud in a close race “blanketing the entire country”. Our model shows that while the conclusion about the magnitude of fraud in the electoral college vs. the popular vote is correct, election fraud *spreading* under the popular vote would look different. More plausibly, it will be concentrated in states with a relative domination of one party. Similarly, [Grofman and Feld \(2005\)](#) argue that the electoral college creates additional incentives for election fraud *at the state level* as predicted by naive logic. As our model demonstrates, the electoral college disincentivizes election fraud, dividing the states into two sets: those in which stealing votes is too expensive and those in which stealing votes does not increase chances of winning. [Swaim \(2020\)](#) correctly states that the electoral college deters fraud, yet considers the main mechanism to be the parties’ inability to predict which states are going to be close. Our model shows that it does not matter: even if the whole fraud game is played ex post, the deterrence effect of the electoral college system is still in place.

After analyzing our model, we discuss election fraud in the U.S. and around the world (see [Lehoucq, 2003](#), and [Simpser, 2013](#), for a comprehensive overview of systematic causes of election fraud around the world). The formal literature on election fraud is limited, yet distinctive. An important strand of the literature is concerned with election fraud in authoritarian regimes and its consequences (see a recent review in [Egorov and Sonin, 2024](#)). In [Rozenas \(2010, 2016\)](#); [Little \(2012, 2015\)](#); [Egorov and Sonin \(2021\)](#) dictators manipulate elections to signal their popularity. In [Magaloni \(2010\)](#) and [Fearon \(2011\)](#), the threat of mass protests limits the incumbent’s willingness to resort to fraud. In our model, while we microfound parties’ opportunities to steal votes, the main argument does not depend on a specific type of fraud.

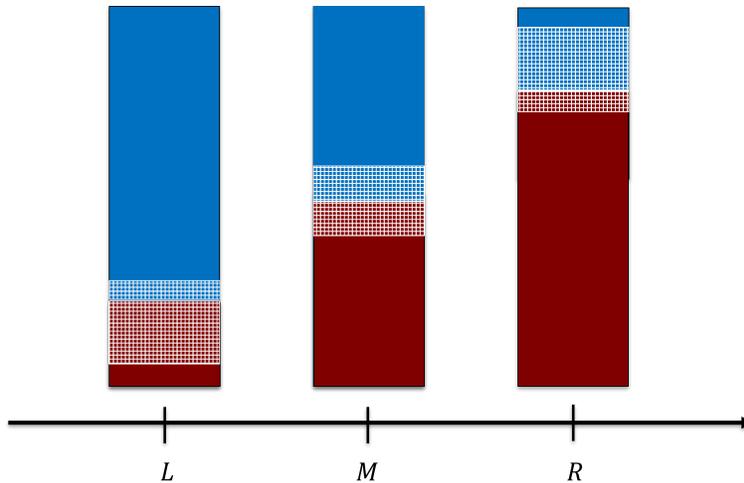


Figure 1: Expected vote shares in three states, L , M , and R . The shaded area denotes votes that can be “stolen” by the other party.

Basic Intuition in a Partial-Equilibrium Setting

The following example illustrates the central logic of our argument. To highlight intuition, we assume that only one party alters the allocation of its resources, while the other party’s strategy is fixed. Thus, the example demonstrates the partial-equilibrium facet of the phenomenon that we study: this argument cannot be extended directly to the general equilibrium setup of a Colonel Blotto game in which both parties allocate resources across different states.

In the simple example, there are two parties, L and R , and three states of equal size, left-wing L , middle M , and right-wing R . Party L enjoys 70% expected support in state L , 50% support in state M , and 30% support in state R . The expected support for party R in these states is 30%, 50%, and 70%, respectively. Consider a scenario in which a common valence shock increases the support of party L by an additional fraction x , $0 < x < 0.1$ in each of the states. Then party L wins the election under both the electoral college and the popular vote rules.

Suppose, however, that party R considers overturning the election by means of electoral fraud, specifically by miscounting the votes for party L as votes for party R . Our

question is which electoral system would be more vulnerable to such fraudulent activities.

Under the electoral college system, party R wins state \mathbf{R} , loses state \mathbf{L} by a large margin, and falls short of winning state \mathbf{M} by a margin of $2x$ votes. To win the election, party R would need to flip a fraction of x votes in state \mathbf{M} , or slightly more than that. However, this would not be sufficient to secure victory under the popular vote system. Indeed, in the popular vote scenario, party R is winning a fraction $0.5 - x$ of the total popular vote. To overcome this disadvantage, party R would need to flip a fraction x of the overall votes, for example, by flipping a fraction of x votes in each state. This implies a larger-scale fraud operation, three times as significant. This observation lends support to the notion that the popular vote system may be more resilient to electoral fraud compared to the electoral college system.

However, this reasoning overlooks the possibility that some votes may be easier to manipulate than others. There are factors that suggest that conducting fraud in “friendly” jurisdictions could be simpler and less risky, as there may be a greater willingness among individuals to participate in fraudulent activities and provide cover for such actions. If so, instead of flipping a proportional share of votes in all states, party R can prioritize its efforts in the favorable jurisdiction \mathbf{R} . In this example, if party R successfully flips three times as many votes, namely $3x$, in state \mathbf{R} alone, it would be sufficient to secure a popular vote victory without resorting to fraud in the other two states. And, in line with this logic, flipping $3x$ votes in state \mathbf{R} might actually be easier than flipping x votes in state \mathbf{M} .

To be more specific, consider the case where $x = 0.06$. Suppose that flipping a vote in any state requires the support of three randomly chosen people in that state who support party R in this election (for instance, the individuals responsible for counting that specific vote) and, even then, the success rate of flipping the vote is only 70%. In state \mathbf{M} , where 40% of the population supports party R (because $0.5 - x = 0.44$), the share of votes

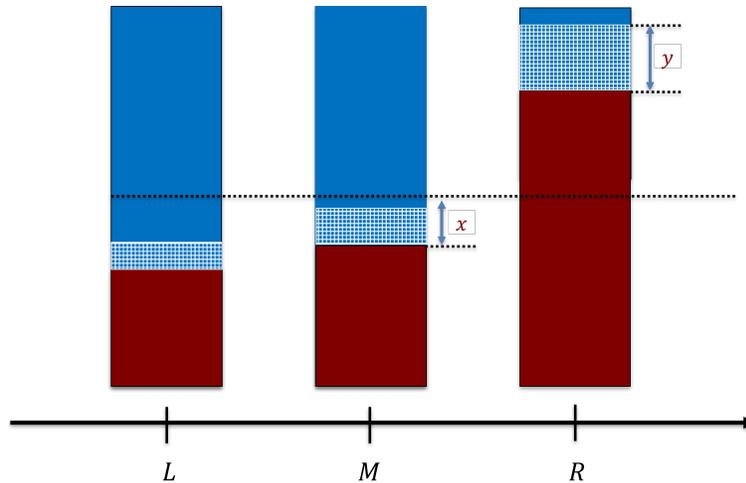


Figure 2: The vote share that party R , the loser in this particular outcome, could steal in state R would have been sufficient to overturn elections under the popular vote, but not under the electoral college as $x < y$.

that can be flipped would be $0.7 \times 0.44^3 = 0.05962$, which is less than the 6% needed to flip \mathbf{M} and win the election under the electoral college system. On the other hand, in state \mathbf{R} , where 70% of the population supports party R , the share of votes that can be flipped would be $0.7 \times 0.64^3 = 0.1835$, which is higher than the 18% needed in state \mathbf{R} to add 6% to the national vote for party R and therefore win the popular vote. Thus, under these conditions, the electoral college system would impede efforts to overturn the election, whereas the popular vote system would not. (Figure 2 illustrates the same point.)

This simple example ignores the parties' need to distribute resources that are necessary to commit fraud across states. In the general model, we take into account both the budget and feasibility constraints and consider how the two electoral systems perform under any electoral shock.

Formal model

States. Consider a country composed of a unit continuum of states (jurisdictions), which is approximated by dividing it into an odd number of discrete states $j \in \left\{ \frac{0}{J}, \frac{1}{J}, \dots, \frac{J}{J} \right\}$,

where J is even. In turn, each state consists of a unit continuum of identical precincts, which is approximated by dividing it into an odd number of discrete precincts $p \in \{\frac{0}{P}, \frac{1}{P}, \dots, \frac{P}{P}\}$, where P is even. Finally, the unit continuum of each precinct is approximated by dividing it into an odd number of discrete individuals $i \in \{\frac{0}{I}, \frac{1}{I}, \dots, \frac{I}{I}\}$, where I is even. So, the total number of discrete individuals in each state, $(P + 1) \times (I + 1)$, is odd. Assuming odd numbers of states and individuals in each state rules out draws; as we make use of the limits when I , J , and P tend to infinity, the oddness does not matter.⁷ Assuming that states (and precincts) are of equal sizes allows us to highlight the main point without extra notation, but the results hold more generally than that. Precincts would be irrelevant in the case of fair elections, but they are important for modeling election fraud.

Parties. There are two strategic players: two political parties, left L and right R . One candidate from each party runs for president; abusing notation, we denote the candidates by L and R as well. We normalize all individuals' utilities by setting them equal to zero if the president is from party L , and denote the utility of individual i from precinct p in state j if party R is in power by u_{ipj} .

These net preferences for party R over party L are a combination of individual-level preferences and state-level preferences. More precisely, we assume that

$$u_{ipj} = y(i) + z(j),$$

where $y(\cdot)$ and $z(\cdot)$ are monotonically increasing functions. This means that indices $i \in \{\frac{0}{I}, \frac{1}{I}, \dots, \frac{I}{I}\}$ and $j \in \{\frac{0}{J}, \frac{1}{J}, \dots, \frac{J}{J}\}$ are arranged in the increased order of support for R . For example, $i = 0$ means the least supportive voter for R and $i = 1$ is the most supportive voter in the precinct. As all precincts are identical within a state, we skip the precinct

⁷Whenever we take a limit with respect to I , J , or P with the sequence members defined for even numbers only, we assume that the limit is defined via a filter base that includes all sequences numbered by even numbers (Bourbaki, 2013).

index in the definition of functions $y(\cdot)$ and $z(\cdot)$.

It is natural to require that $y(\cdot)$ and $z(\cdot)$ satisfy symmetry around $\frac{1}{2}$: $y\left(\frac{1}{2} - x\right) = -y\left(\frac{1}{2} + x\right)$ and $z\left(\frac{1}{2} - x\right) = -z\left(\frac{1}{2} + x\right)$ and $z(1) < y(1)$. The first assumption guarantees ex ante symmetry of preferences for both parties and across states, and the latter assumption ensures that in each state there are individuals supporting each party, which is both realistic and allows us to avoid corner cases. To further simplify our analysis, we focus on the case where individual- and state-specific preferences are linear:

$$\begin{aligned} y(i) &= \beta \left(i - \frac{1}{2} \right), \\ z(j) &= \gamma \left(j - \frac{1}{2} \right), \end{aligned}$$

with $\beta > \gamma$. Parameters β and γ reflect political polarization. Higher values of β correspond to a higher polarization *within* states, but the average political alignment of the state stays the same. In contrast, a higher value of γ reflects a higher polarization *between* states while keeping within-state polarization constant.

Example 1. Take $\beta = 1$ and $\gamma = \frac{1}{2}$. Then $y(x) = x - \frac{1}{2}$ and $z(x) = \frac{1}{2} \left(x - \frac{1}{2} \right)$. The preferences of individuals in states are then equally spaced, ranging from $-\frac{3}{4}$ to $\frac{1}{4}$ in the leftmost state 0 and between $-\frac{1}{4}$ and $\frac{3}{4}$ in the rightmost state 1. The percentage of individuals who prefer the party R ranges from approximately $\frac{1}{4}$ (for I sufficiently large) of the support in the leftmost state to approximately $\frac{3}{4}$ of the support in the rightmost state.

The model so far has been completely symmetric. Assume that before voting, all individuals receive a common shock δ that affects the willingness to have the candidate from party R elected. Specifically, we define $w_{ipj} = u_{ipj} + \delta$ and assume that each individual votes for party R candidate ($v_{ipj} = R$) if $w_{ipj} > 0$ and for party L candidate ($v_{ipj} = L$) otherwise (note that sincere voting is indeed an equilibrium in the voting game). To ensure that both parties get a positive share of votes in all states, we assume that $|\delta| < \frac{1}{2}(\beta - \gamma)$. Lastly, we assume that voters who are, given the shock, indifferent between voting for

either candidate, vote for candidate L ; since this can happen only for a finite number of values of δ , this assumption does not have substantive consequences but simplifies notation.

With this notation, as I tends to infinity, the share of supporters of party L in state j tends to

$$\frac{1}{2} - \frac{\delta}{\beta} - \frac{\gamma}{\beta} \left(j - \frac{1}{2} \right). \quad (1)$$

Election Fraud. There are countless ways to commit election fraud. These include allowing ineligible (e.g., deceased) people to vote, possibly multiple times, manipulating voter rolls in other ways, failing to count votes that were legitimately cast, putting ballots in the wrong pile when counting, falsification of protocols, etc. To keep matters simple and to avoid dealing with turnout and the total number of votes, we focus on the specific type of fraud when votes cast for one candidate are counted for their opponent.

We assume that to commit fraud, the party R (or L) needs to find a sufficient number of individuals (or groups of individuals) willing to do so during the count. One natural way to model this is as follows. Suppose that committing fraud in each precinct in any state requires the conspiracy of all the individuals involved in the counting, which are assumed to be $k \geq 2$ individuals randomly drawn from that precinct. For example, these could be those who count, supervise counting, or perhaps other electoral officials. This could be a local prosecutor who would look the other way or write off any inconsistencies as human errors. In practice, the composition of this group of individuals would reflect both the local population (e.g., poll workers) and the employees of local governments (e.g., prosecutors). These individuals conspire with probability σ (the opposite of honesty) if they all support the candidate who would benefit from the fraud; otherwise, they conspire with probability zero.

We further assume that the scope of fraud has limits on both the extensive and intensive margins. On the intensive margin, the conspirators in each precinct are able to

change at most share λ of votes; changing more votes could be challenged, detected on recounting, and impossible to write off as an innocuous human error. In an extensive margin, the total share of votes that any party can change in all states is constrained by the resources it has available: we assume that the party is able to spend the budget B on election fraud if it allows it to win the election. At the same time, switching votes is costly (due to logistical or reputational considerations), and we capture this with a linear cost: changing share α of all votes in the country costs the party αC . Denoting $\mu = B/C$, we get that a party would never switch more than share μ of votes, even if it means moving from losing the election for sure to winning the election. In other words, fraud is assumed to be limited, to some extent, both locally (at the precinct level) and globally (for the whole election).

Electoral systems. Each individual casts their vote $v_{ipj} \in \{L, R\}$, but in the process of committing fraud these votes may be counted as some $v_{ipj}^c \in \{L, R\}$, which are what matters for the outcome of the election. We consider two electoral systems. Under popular vote (PV), candidate R is elected if and only if she gets a majority of votes:

$$\sum_{j=0}^J \sum_{p=1}^P \sum_{i=0}^I \mathbb{1}\{v_{ipj}^c = R\} > \sum_{j=0}^J \sum_{p=1}^P \sum_{i=0}^I \mathbb{1}\{v_{ipj}^c = L\}.$$

Under electoral college (EC), candidate R is elected if and only if she wins in a majority of states:

$$\sum_{j=0}^J \mathbb{1} \left\{ \sum_{p=1}^P \sum_{i=0}^I \mathbb{1}\{v_{ipj}^c = R\} > \sum_{p=1}^P \sum_{i=0}^I \mathbb{1}\{v_{ipj}^c = L\} \right\} > \frac{J+1}{2}.$$

Note that without fraud, the two electoral systems produce identical results with probability 1: candidate R wins under either system if $\delta > 0$ and loses if $\delta < 0$.

Timing. The sequence of moves in the game is as follows.

1. In each precinct in each state, a random set of individuals C_{jp} with $|C_{jp}| = k$ is picked

to become the electoral commission.

2. Nature picks a parameter δ from some distribution with full support on the real line, and everyone observes it.
3. Each individual i in precinct p in state j casts a vote $v_{ipj} \in \{L, R\}$, with $v_{ipj} = R$ if and only if $w_{ipj} > 0$.
4. Each party, L and R , observes which electoral commissions would be agreeable to conduct fraud, and then they decide, simultaneously, how many votes they want flipped in each such precinct.
5. Counting the votes that include the flipped ones in each precinct, v_{ipj}^c , $i \in I$, $p \in P$, and $j \in J$, the winner of the election is determined according to the electoral system used (PV or EC).
6. Everyone gets their payoffs. For party R , it is $B\mathbb{I}_{\{R \text{ won}\}} - \alpha_R C$, where \mathbb{I} is the indicator function and α_R is the share of votes that party R flipped. For party L the payoff is analogous.

Analysis

We start by establishing the existence and some general properties of equilibria with any finite number of states, electoral precincts, and citizens in each precinct. Then, to compare the two systems, we will consider the limit case where the numbers of states, precincts in each state, and individuals in each precinct are large.

Existence and Uniqueness of Equilibria. We first show the existence of the Nash equilibrium in the game between two parties. Given any distribution of actual votes $\{v_{ipj}\}$, each party's strategy set involves flipping a finite number of votes across states and

precincts. For each realization of shock δ , this is a finite game and, therefore, has at least one Nash equilibrium in, generally, mixed strategies.

We are particularly interested in distinguishing situations where there is fraud in equilibrium from those where there is no fraud in equilibrium. Here, the multiplicity of equilibria could present a problem. However, as it turns out, the uniqueness of the relevant equilibrium depends on the fundamentals of the model and not on equilibrium selection. Specifically, we show that generically, if there is fraud with a positive probability in one equilibrium, then there is fraud in every equilibrium. For each player, denote the strategy in which it does not commit fraud by NF ; our next result shows that if (NF, NF) is a strict Nash equilibrium, then this equilibrium is unique.

Proposition 1. *Under either electoral system, for a generic set of parameters, if there is fraud in one equilibrium, then every Nash equilibrium involves fraud. In other words, if (NF, NF) is a Nash equilibrium, then it is a unique Nash equilibrium.*

Proof of Proposition 1. First, observe that unless $\frac{B}{C}$ is a rational number (which is true for a degenerate set of parameters), then if (NF, NF) is a Nash equilibrium, then it is a strict Nash equilibrium. (A Nash equilibrium is strict if each strategy involved is a unique maximizer.) This follows from the fact that there is a finite number of voters, so $B - \alpha_R C = 0$ implies that $\frac{B}{C}$ is rational.

Indeed, suppose that in addition to (NF, NF) , there is another equilibrium, (\hat{s}_L, \hat{s}_R) , possibly in mixed strategies. Suppose without loss of generality that player L would lose absent fraud. Then $U_L(NF, NF) = 0$, and furthermore $U_L(NF, \hat{s}_R) = 0$ (because if L loses without fraud, then it also loses with fraud by party R).

Now observe that $U_L(\hat{s}_L, \hat{s}_R) \geq U_L(NF, \hat{s}_R) = 0$ since (\hat{s}_L, \hat{s}_R) is an equilibrium. This implies that $U_L(\hat{s}_L, NF) \geq U_L(\hat{s}_L, \hat{s}_R) \geq 0$, with the former inequality holding since if party R switches from \hat{s}_R to NF , this cannot decrease party L 's payoff. Consequently, $U_L(\hat{s}_L, NF) \geq 0 = U_L(NF, NF)$, which contradicts the assumption that (NF, NF) is a strict Nash equilibrium. ■

The No Fraud Conditions. In light of Proposition 1, we are interested in characterizing the conditions under which (NF, NF) is an equilibrium, that is, there exists an equilibrium that does not involve fraud. Proposition 1 guarantees that if there is no fraud in one equilibrium, then there is no fraud in any equilibrium for generic parameter values. Naturally, fraud is less likely if the election is not too close. However, Proposition 2 below establishes a much stronger result.

We prove that for each of the two electoral systems, there exists a threshold such that any election outcome with vote difference exceeding this threshold is safe from fraud. This happens when the loser finds it either infeasible or too costly to overturn the election, in which case the winner does not want to engage in fraud either. For large elections, these thresholds are easy to characterize using explicit formulas, which enables comparison of the two electoral systems.

More precisely, the pair of strategies (NF, NF) is an equilibrium if the losing party at least weakly prefers NF to committing fraud, because the winning party prefers no fraud as long as the losing party commits none. For the losing party to commit fraud, two constraints need to be satisfied. First, fraud must be feasible: the losing party should be able to flip enough votes to overturn the election. Second, fraud should not be too costly, i.e. within the budget of the party committing fraud (we implicitly assume that winning elections is sufficiently important so that budget constraint gets into play before the party's willingness to spend the budget). Under either electoral system, both of these constraints are more likely to be satisfied when $|\delta|$ is small; this is when the election is close and thus fewer votes must be flipped to change the results. When the numbers of states, precincts and individuals are large, we are able to derive sharp conditions for when each of the constraint is satisfied, for each electoral system, and obtain complete characterization.

Let us start with the electoral college. Define variables $\hat{\delta}_{EC}$ and $\tilde{\delta}_{EC}$ as the unique pos-

itive solutions to the following equations:

$$\lambda \times \sigma \times \left(\frac{1}{2} - \frac{\hat{\delta}_{EC}}{\beta} \right)^k = \frac{\hat{\delta}_{EC}}{\beta}, \quad (2)$$

$$C \times H(\tilde{\delta}_{EC}) = B, \quad (3)$$

where

$$H(\delta) = \begin{cases} \frac{1}{2} \frac{\delta^2}{\beta\gamma} & \text{if } \delta \leq \frac{\gamma}{2}; \\ \frac{\delta}{2\beta} - \frac{\gamma}{8\beta} & \text{if } \delta > \frac{\gamma}{2}. \end{cases}$$

Now, we can define the critical threshold $\Delta_{EC} = \min \{ \hat{\delta}_{EC}, \tilde{\delta}_{EC} \}$ so that both the feasibility and budget constraints are satisfied as described below.

Equation (2), which defines the threshold $\hat{\delta}_{EC}$, is the *feasibility constraint*; it guarantees that stealing election is feasible under the electoral college. In other words, if $\delta > \hat{\delta}_{EC}$, then there are not enough votes in the appropriate states for the losing party to overturn the outcome. Indeed, take any $\delta \in (-\hat{\delta}_{EC}, \hat{\delta}_{EC})$. Let us assume, without a loss of generality, that if the shock is nonnegative, $\delta \geq 0$, which means that in the absence of fraud party L loses. Consider any state j . Recall that the share of individuals in this state supporting party L tends to $\frac{1}{2} - \frac{\delta}{\beta} - \frac{\gamma}{\beta} \left(j - \frac{1}{2} \right)$ per equation (1) as $I, P \rightarrow \infty$. This expression equals $\frac{1}{2} - \frac{\delta}{\beta}$ for state $j = \frac{1}{2}$ and is higher than that in any state $j < \frac{1}{2}$. Thus, the number of votes that need to be switched in state $j = \frac{1}{2}$ for party L to win tends to $\frac{\delta}{\beta}$ under the same limit $I, P \rightarrow \infty$, and this limit is lower than that in $j < \frac{1}{2}$. By the law of large numbers, as $I, P \rightarrow \infty$, the share of votes that can be stolen in state $j = \frac{1}{2}$ is $\lambda\sigma \left(\frac{1}{2} - \frac{\delta}{\beta} \right)^k$ (recall that all precincts within a state are identical). Since we assumed $\delta < \hat{\delta}_{EC}$, stealing this number of votes is sufficient to change the election outcome in this state. By the argument above, in other states $j < \frac{1}{2}$ that party L lost, the number of votes needed to be switched is lower and the share of votes that can be switched is higher, so overturning elections in those states is also feasible with a probability arbitrarily close to 1. Thus, as long as $\delta \in (-\hat{\delta}_{EC}, \hat{\delta}_{EC})$, where $\hat{\delta}_{EC}$ is defined in (2), overturning elections is feasible for party L .

Equation (3), which defines $\tilde{\delta}_{EC}$, is the *budget constraint*. If $\delta > \tilde{\delta}_{EC}$, then the losing party does not have sufficient resources to engage in fraud. The function $H(\delta)$ integrates the votes that the losing party needs to recover in the states that it lost. If the losing party won at least some states (the more typical scenario), i.e. $\delta \leq \frac{\gamma}{2}$, then $H(\delta) = \frac{1}{2} \frac{\delta^2}{\beta\gamma}$. If the losing party lost all states, i.e. $\delta > \frac{\gamma}{2}$, then $H(\delta) = \frac{\delta}{2\beta} - \frac{\gamma}{8\beta}$. In the latter case, the losing party needs to overturn the election in half of the states.

Does party L have sufficient resources to overturn the election, given its budget is B ? For large I and P , the share of votes that needs to be changed in state j is $\frac{\gamma}{\beta} \left(j - \frac{1}{2} \right) + \frac{\delta}{\beta}$, as follows from (1), and this change is necessary only in states where the party L lost. These are states $j \in \left[\max \left\{ \frac{1}{2} - \frac{\delta}{\gamma}, 0 \right\}, \frac{1}{2} \right]$. As $j \rightarrow \infty$, the aggregate share of votes that need to be changed is equal to

$$\int_{\max\{\frac{1}{2}-\frac{\delta}{\gamma}, 0\}}^{\frac{1}{2}} \left(\frac{\gamma}{\beta} \left(j - \frac{1}{2} \right) + \frac{\delta}{\beta} \right) dj = \min \left\{ \frac{\delta^2}{2\beta\gamma}, \frac{\delta}{2\beta} - \frac{\gamma}{8\beta} \right\}.$$

We showed that as long as $\delta \in (-\tilde{\delta}_{EC}, \tilde{\delta}_{EC})$, where $\tilde{\delta}_{EC}$ is defined in (3), the party L has enough resources to overturn the elections.

Note that if $\delta < \tilde{\delta}_{EC}$, the party L strictly prefers to pay the cost of converting this share of votes because the benefit outweighs it. Consequently, if party R plays NF , doing the same is not the best response for party L , which shows that for $|\delta| < \delta_{EC}$, (NF, NF) is not a Nash equilibrium; so, provided that I, P, J are large enough, any equilibrium involves fraud.

Consider the alternative case where $|\delta| > \Delta_{EC} = \min \{ \hat{\delta}_{EC}, \tilde{\delta}_{EC} \}$; without loss of generality assume that δ is positive. In this case, either $\delta > \hat{\delta}_{EC}$ or $\delta > \tilde{\delta}_{EC}$. In the first case, overturning elections in state $j = \frac{1}{2}$ is possible with a probability arbitrarily close to 0 for large I, P . In the latter case, the share of votes needed to be overturned is higher than $\frac{B}{C}$ with an arbitrarily high probability as $I, P, J \rightarrow \infty$. Consequently, with a probability approaching 1, playing NF is a best response for party L . As for party R , if party L does

not commit fraud and loses the election, then committing fraud does not make sense for party R either. As a result, if $\delta > \Delta_{EC}$, the probability that (NF, NF) is equilibrium is arbitrarily close to 1 in the limit.

We now need to do a similar exercise for the case of popular vote. Define $\hat{\delta}_{PV}$ and $\tilde{\delta}_{PV}$ as unique positive solutions to the following equations:

$$\lambda\sigma \times \int_0^1 \left(\frac{1}{2} - \frac{\hat{\delta}_{PV}}{\beta} - \frac{\gamma}{\beta} \left(j - \frac{1}{2} \right) \right)^k dj = \frac{\hat{\delta}_{PV}}{\beta}, \quad (4)$$

$$C \times \frac{\tilde{\delta}_{PV}}{\beta} = B, \quad (5)$$

and let $\Delta_{PV} = \min \{ \hat{\delta}_{PV}, \tilde{\delta}_{PV} \}$. Similarly to the case of electoral college, equation (4) guarantees that fraud is feasible under the popular vote. That is, if $\delta > \hat{\delta}_{PV}$, then there are not enough votes for the losing party to overturn the outcome. Similarly, equation (5) reflects the budget constraint: if $\delta > \tilde{\delta}_{PV}$, then the losing party would not engage in fraud because of the lack of resources.

Consider $|\delta| < \Delta_{PV}$, and without loss of generality assume that δ is positive. Now party L is losing absent fraud and the total share of votes that it needs to overturn tends to $\frac{\delta}{\beta}$ provided that I, P, J are large. Since $\delta < \tilde{\delta}_{PV}$, the benefits of winning outweigh the cost of fraud. As far as feasibility is concerned, for I, P sufficiently high, the share of votes that party L can switch in state j is $\lambda\sigma \left(\frac{1}{2} - \frac{\delta}{\beta} - \frac{\gamma}{\beta} \left(j - \frac{1}{2} \right) \right)^k$, and as the number of states goes up, the total share of votes that may be switched tends to the left-hand side of (4). Consequently, as $I, P, J \rightarrow \infty$, NF is not the best response for party L with arbitrarily high probability, and as a result there is fraud in equilibrium with probability tending to 1.

Conversely, if $|\delta| > \Delta_{PV}$, and we again assume that δ is positive, then for I, P, J sufficiently high, either $\delta > \hat{\delta}_{PV}$ or $\delta > \tilde{\delta}_{PV}$ is violated with an arbitrarily high probability. If so, as in the case of the electoral college, (NF, NF) is an equilibrium with a probability that tends to 1 as $I, P, J \rightarrow \infty$.

The following proposition 2 formally summarizes the above discussion.

Proposition 2. For δ_{EC} and δ_{PV} defined above:

(i) Under the electoral college system, if the absolute value of shock δ satisfies $|\delta| < \Delta_{EC}$, then $\lim_{I,P,J \rightarrow \infty} \Pr_{EC}(NF, NF) = 0$, and if the absolute value of shock δ satisfies $|\delta| > \Delta_{EC}$, then $\lim_{I,P,J \rightarrow \infty} \Pr_{EC}(NF, NF) = 1$;

(ii) Under the popular vote system, if the absolute value of shock δ satisfies $|\delta| < \Delta_{PV}$, then $\lim_{I,P,J \rightarrow \infty} \Pr_{PV}(NF, NF) = 0$, and if the absolute value of shock δ satisfies $|\delta| > \Delta_{PV}$, then $\lim_{I,P,J \rightarrow \infty} \Pr_{PV}(NF, NF) = 1$.

As Proposition 2 shows, for small shocks and therefore close vote tallies, large elections feature fraud with probability 1. This is also not particularly surprising. Indeed, if the election is so close that only one vote would change the result, it is not reasonable to believe that among thousands of people involved in counting, not a single one would make a deliberate mistake. At the same time, one could also argue that in extremely close elections, fraud is not a major societal problem: from the utilitarian perspective, in close elections, any outcome reflects the will of about half of the electorate.

At the same time, in a landslide election, fraud is next to impossible because it is either not feasible, too costly, or both. Naturally, our results lead to the following question: How far apart should the vote for the two parties be in order to deter fraud, and how does it depend on the electoral system? Within each electoral system, for large elections, the answer to the first question is already given by Proposition 2: there is no fraud for $|\delta| > \Delta_{PV}$ under the popular vote and for $|\delta| > \Delta_{EC}$ under the electoral college.

Feasibility and Budget Constraints. Our main question is which electoral system deters fraud for a wider range of parameter values. Ultimately, we will have proved that the electoral college deters fraud for a larger range of shocks than the popular vote system when B , the parties' budget, or k , the number of members of the local election committee that need to go along with the fraud, are higher. Other parameters work in the other direction: the electoral college offers better protection against fraud when λ , the maxi-

num share of votes that can be stolen in a single precinct, σ , the probability with which an individual election committee member goes along with the fraud, or C , the cost of flipping an individual vote is lower.

First, we prove that the thresholds for each of the electoral systems defined in (2) and (4) (feasibility) and in (3) and (5) (budget constraint) satisfy the following inequalities: $\hat{\delta}_{EC} < \hat{\delta}_{PV}$ and $\tilde{\delta}_{EC} > \tilde{\delta}_{PV}$. In other words, the feasibility constraint is tighter for the electoral college and the budget constraint is tighter for the popular vote.

To show that $\hat{\delta}_{EC} < \hat{\delta}_{PV}$, suppose, to obtain a contradiction, that $\hat{\delta}_{EC} \geq \hat{\delta}_{PV}$. We then have, using (2), (4), and Jensen's inequality:

$$\begin{aligned} \frac{\hat{\delta}_{PV}}{\beta} &= \lambda\sigma \times \int_0^1 \left(\frac{1}{2} - \frac{\hat{\delta}_{PV}}{\beta} - \frac{\gamma}{\beta} \left(j - \frac{1}{2} \right) \right)^k dj \\ &> \lambda\sigma \times \left(\frac{1}{2} - \frac{\hat{\delta}_{PV}}{\beta} \right)^k \geq \lambda\sigma \times \left(\frac{1}{2} - \frac{\hat{\delta}_{EC}}{\beta} \right)^k \\ &= \frac{\hat{\delta}_{EC}}{\beta} \geq \frac{\hat{\delta}_{PV}}{\beta}. \end{aligned}$$

Since one inequality is strict, this is a contradiction, which proves that $\hat{\delta}_{EC} < \hat{\delta}_{PV}$.

To show that $\tilde{\delta}_{EC} > \tilde{\delta}_{PV}$, suppose, to obtain a contradiction, that $\tilde{\delta}_{EC} \leq \tilde{\delta}_{PV}$ and consider two cases. If $\tilde{\delta}_{EC} \leq \frac{\gamma}{2}$, then by (3), $\tilde{\delta}_{EC}$ satisfies $\frac{1}{2} \frac{\tilde{\delta}_{EC}^2}{\beta\gamma} = \frac{B}{C}$, and from (5) we have $\frac{\tilde{\delta}_{PV}}{\beta} = \frac{B}{C}$. We have

$$\frac{B}{C} = \frac{\tilde{\delta}_{PV}}{\beta} \geq \frac{\tilde{\delta}_{EC}}{\beta} \geq \frac{\tilde{\delta}_{EC}}{\beta} \times \frac{2\tilde{\delta}_{EC}}{\gamma} > \frac{1}{2} \frac{\tilde{\delta}_{EC}^2}{\beta\gamma} = \frac{B}{C},$$

which is a contradiction. Similarly, if $\tilde{\delta}_{EC} > \frac{\gamma}{2}$, then by (3) we have $\frac{\tilde{\delta}_{EC}}{2\beta} - \frac{\gamma}{8\beta} = \frac{B}{C}$, and therefore

$$\frac{B}{C} = \frac{\tilde{\delta}_{PV}}{\beta} \geq \frac{\tilde{\delta}_{EC}}{\beta} > \frac{\tilde{\delta}_{EC}}{2\beta} > \frac{\tilde{\delta}_{EC}}{2\beta} - \frac{\gamma}{8\beta} = \frac{B}{C},$$

which is again a contradiction. Therefore, we have proved $\tilde{\delta}_{EC} > \tilde{\delta}_{PV}$. Proposition 3 formally states the results that we just proved.

Proposition 3. (i) *The feasibility constraint is tighter for the electoral college: $\hat{\delta}_{EC} < \hat{\delta}_{PV}$.*

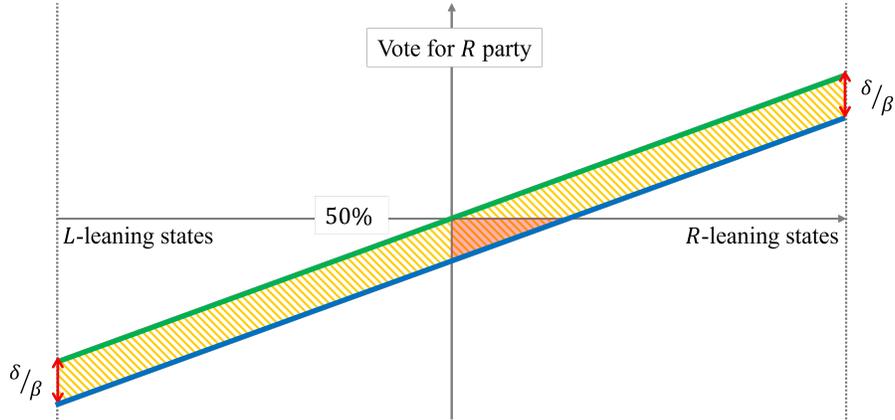


Figure 3: **When the feasibility constraint is *not* binding:** The yellow (shaded) area is the amount of vote party R needs to “steal” after a shock of size δ to win the popular vote. Under the electoral college, the needed vote is a much smaller red (solid) area.

(ii) *The budget constraint is tighter for the popular vote: $\tilde{\delta}_{EC} > \tilde{\delta}_{PV}$.*

The intuition underlying Proposition 3 warrants a brief discussion. In either system, fraud is possible if both the budget and the feasibility constraints are lax; in other words, if the losing party is both willing and able to commit fraud. Let us compare the corresponding constraints under the two electoral systems. First, the budget constraint is tighter under popular vote: it is possible that it is satisfied under the electoral college and that it is violated under the popular vote, but not vice versa. This is intuitive: to overturn elections under the electoral college, the losing party only needs to change a fraction of votes it would need to change under popular vote, as it only needs to undo some votes in the states that it would have won absent the shock (see Figure 3).

The situation is the opposite when it comes to the feasibility constraint. Under the electoral college, the losing party is able to overturn the election if and only if it is able to flip the median state, which requires changing a share of $|\delta|/\beta$ votes in that state. Indeed, in all other states where the party is losing but would win absent shock, it is easier to commit fraud (the party is more popular) and fewer votes must be changed (for the same reason). Under the popular vote system, the losing party needs to find the same share of votes across the entire country. Since finding enough people willing to conspire is

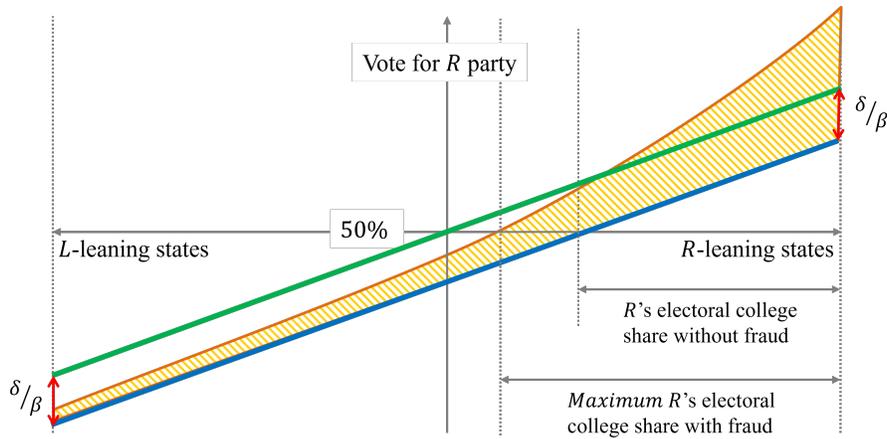


Figure 4: **When the feasibility constraint is binding:** In each state, the yellow (shaded) interval is the amount of vote party R can “steal” in this state. Though the total yellow (shaded) area might be sufficient to cover the popular vote deficit, R cannot overcome L ’s electoral college advantage after a shock of size δ .

much easier in states where the party is very popular (or, in other words, it is sufficiently difficult to find many votes in the median state), the feasibility constraint is tighter under the electoral college system than under the popular vote (see Figure 4).

For this result, the critical assumption was that for each party, the “feasibility to conduct fraud” is convex in the composition of the officials in a given state. It is *much* easier to flip votes when the state is hyper-partisan. The closer the state is to the extreme partisanship, the higher the marginal potential of fraud for the dominant party. This assumption means that, to take a hypothetical example, for the Republican party, conducting fraud in very Republican West Virginia would be much easier than in battleground Wisconsin, but the same change in the composition of the officials from California (in which Republicans are relatively weak) to Wisconsin would not result in a much higher fraud potential.⁸

⁸While we do not model ideological polarization *within* parties, the same logic applies: in Georgia in 2020, President Trump’s attempts to influence the outcome of the close election, which he lost, were dwarfed by moderate Republican office holders (Espinoza, 2021).

Electoral College vs. Popular Vote. Our next goal is to study comparative statics with respect to model parameters. Electoral college deters fraud better than the popular vote system whenever $\Delta_{PV} > \Delta_{EC}$, so we need to study how a change in model parameters affects the relationship between these two thresholds.

Since $\hat{\delta}_{EC} < \hat{\delta}_{PV}$ and $\tilde{\delta}_{EC} > \tilde{\delta}_{PV}$ by Proposition 3, of these four values, the minimum is equal to either $\hat{\delta}_{EC}$ or $\tilde{\delta}_{PV}$: $\min\{\Delta_{EC}, \Delta_{PV}\} = \min\{\hat{\delta}_{EC}, \tilde{\delta}_{PV}\}$. Thus, $\Delta_{EC} < \Delta_{PV}$ if and only if $\hat{\delta}_{EC} < \tilde{\delta}_{PV}$. Notice that $\hat{\delta}_{EC}$ satisfies (2) and is therefore increasing in λ and σ and decreases in k (and does not depend on B or C), while $\tilde{\delta}_{PV}$ satisfies (5) and is therefore increasing in B and decreasing in C (and does not depend on λ , σ , or k). The comparative statics results about thresholds $\Delta_{EC} = \Delta_{EC}(\lambda, \sigma, k, B, C)$ and $\Delta_{PV} = \Delta_{PV}(\lambda, \sigma, k, B, C)$ follow immediately from these observations. In each statement, we vary one of the parameters, leaving all other parameters intact.

Proposition 4. (i) *There exists a threshold $\bar{\lambda} \geq 0$ such that for any $\lambda \leq \bar{\lambda}$, $\Delta_{EC}(\lambda) \leq \Delta_{PV}(\lambda)$, that is, the electoral college deters fraud for a wider range of shocks than the popular vote, and for any $\lambda > \bar{\lambda}$, $\Delta_{EC}(\lambda) > \Delta_{PV}(\lambda)$, that is, the popular vote provides better protection.*

(ii) *There exists a threshold $\bar{\sigma} \geq 0$ such that for any $\sigma \leq \bar{\sigma}$, $\Delta_{EC}(\sigma) \leq \Delta_{PV}(\sigma)$ and for any $\sigma > \bar{\sigma}$, $\Delta_{EC}(\sigma) > \Delta_{PV}(\sigma)$.*

(iii) *There exists a threshold $\bar{C} \geq 0$ such that for any $C \leq \bar{C}$, $\Delta_{EC}(C) \leq \Delta_{PV}(C)$ and for any $C > \bar{C}$, $\Delta_{EC}(C) > \Delta_{PV}(C)$.*

(iv) *There exists a threshold $\underline{k} \geq 0$ such that for any $k \leq \underline{k}$, $\Delta_{PV}(k) \leq \Delta_{EC}(k)$, that is, the popular vote deters fraud for a wider range of shocks than the electoral college, and for any $k > \underline{k}$, it is vice-versa.*

(v) *There exists a threshold $\underline{B} \geq 0$ such that for any $B \leq \underline{B}$, $\Delta_{PV}(B) \leq \Delta_{EC}(B)$, that is, the popular vote deters fraud for a wider range of shocks than the electoral college, and for any $B > \underline{B}$, it is vice-versa.*

Proposition 4 is stated in terms of the parameters that give the electoral college the advantage in preventing fraud. Of course, the converse of these statements is also true.

The lower values of B and k or the higher values of λ , σ or C increase the probability of fraud in the electoral college compared to the popular vote.

The comparison between the two systems reduces to the following question. Is it the budget constraint under the popular vote or the feasibility constraint under the electoral college that does a better job deterring fraud? With only two “active” constraints, the comparison is straightforward. A lower B or higher C tightens the budget constraint, making the popular vote more attractive. In contrast, lower λ or σ or higher k make conspiracies more difficult to assemble or less effective, tightening the budget constraint and making the electoral college more resilient against fraud.

The Effect of Polarization. We now turn to the effects of polarization on the deterrence of fraud provided by the two electoral systems. In our framework, there are two parameters that capture political polarization. Parameter β , which enters in individual-specific preferences, is higher if individuals have more polarized preferences within any state – yet changes in β do not affect the within-state average. An increase in β decrease the share of persuadable people in any state, but does not affect the average alignment of the state. In contrast, parameter γ increases polarization between states while leaving within-state polarization constant. In other words, a higher γ would make the red states redder and the blue states bluer, while reducing the number of purple states.

With respect to these polarization parameters, we have the following comparative statics. First, consider an increase in state-level polarization, so γ is higher. This change has two consequences. Under the electoral college, this relaxes the budget constraints, as the losing party loses fewer votes in fewer states, thereby making fraud cheaper. In contrast, under the popular vote, polarization affects the feasibility constraint, as the increased difficulty of committing fraud in hostile states is more than outweighed by the reduced difficulty of committing fraud in friendly states. Remarkably, this increase in γ does not affect the feasibility constraint under the electoral college system (since it de-

depends on the median state only) or the budget constraint under the popular vote system (because the total number of votes that need to be changed is the same). Since the comparison between the two electoral systems hinges on these two latter constraints, an increase in between-state polarization does not change the relative ranking of the systems, nor does it affect the effectiveness of the better system at deterring fraud. At the same time, it can make the worse of the two systems even worse.

The situation is different with respect to individual-level polarization β . An increase in β makes all individuals less sensitive to shock δ , and the losing party would now need to change fewer votes. This relaxes all constraints, and, in particular, it makes both the electoral college and the popular vote systems more prone to fraud. However, a more careful examination of the constraints reveals that the ranking of the two systems would not be affected in this case either. In summary, we have the following result.

Proposition 5. *An increase in individual-level polarization β increases thresholds Δ_{EC} and Δ_{PV} , making fraud equilibrium possible for a wider range of parameters in both the electoral college and the popular vote systems, but preserves the relative ranking of the two electoral systems. An increase in state-level polarization γ does not affect Δ_{EC} or Δ_{PV} and thus does not affect the effectiveness of either system in deterring fraud or the ranking between the two systems. However, it makes the worse system weakly worse.*

Proof of Proposition 5. Notice that the feasibility constraint (2) depends on $\hat{\delta}_{EC}$ and β only through the ratio $\frac{\hat{\delta}_{EC}}{\beta}$, and similarly, the budget constraint (5) depends on $\tilde{\delta}_{PV}$ and β only through the ratio $\frac{\tilde{\delta}_{PV}}{\beta}$ only. Let $\beta' > \beta$. The values that solve (2) and (5) now satisfy $\frac{\hat{\delta}'_{EC}}{\beta'} = \frac{\hat{\delta}_{EC}}{\beta}$ and $\frac{\tilde{\delta}'_{PV}}{\beta'} = \frac{\tilde{\delta}_{PV}}{\beta}$. Thus, $\hat{\delta}'_{EC} > \hat{\delta}_{EC}$ and $\tilde{\delta}'_{PV} > \tilde{\delta}_{PV}$. In addition, it is straightforward to see from (3) and (4) that $\tilde{\delta}'_{EC} > \tilde{\delta}_{EC}$ and $\hat{\delta}'_{PV} > \hat{\delta}_{PV}$, which implies that $\Delta'_{EC} > \Delta_{EC}$ and $\Delta'_{PV} > \Delta_{PV}$. Thus, both electoral systems are more prone to fraud under β' than under β . Finally, the sign of $\hat{\delta}'_{EC} - \tilde{\delta}'_{PV}$ is the same as that of $\hat{\delta}_{EC} - \tilde{\delta}_{PV}$, because

$$\hat{\delta}'_{EC} - \tilde{\delta}'_{PV} = \frac{\beta'}{\beta} \left(\hat{\delta}_{EC} - \tilde{\delta}_{PV} \right).$$

This shows that if $\Delta_{EC} < \Delta_{PV}$, then $\hat{\delta}_{EC} < \tilde{\delta}_{PV}$ and hence $\hat{\delta}'_{EC} < \tilde{\delta}'_{PV}$ and thus $\Delta'_{EC} < \Delta'_{PV}$, and vice versa. This shows that the increase in β does not change the results of which electoral system are more preferable.

Finally, notice that neither (2) nor (5) depends on γ , and therefore if γ increases to $\gamma'' > \gamma$, we would still have $\hat{\delta}''_{EC} = \hat{\delta}_{EC}$ and $\tilde{\delta}''_{PV} = \tilde{\delta}_{PV}$. For the last result, notice that $\tilde{\delta}_{EC}$ and $\hat{\delta}_{PV}$ are increasing in γ , as follows from (3) and (4), respectively. Therefore, the worse system may be affected by this change in γ , provided that $\tilde{\delta}_{EC} < \hat{\delta}_{EC}$ for the electoral college system and that $\hat{\delta}_{PV} < \tilde{\delta}_{PV}$ for the popular vote system, and if so, it becomes more prone to fraud. ■

Discussion

One inherent challenge with our theory is the absence of a readily available experiment to test it. Although an experiment falsifying our theory could be easily constructed in principle, in practice, very few countries around the world elect a strong executive by anything but a popular vote. None of these countries are mature democracies, as most mature democracies trace their legal origins to the British parliamentary system (Glaeser and Shleifer, 2002). Those countries that have a strong presidency are often the same countries where election fraud is rampant or, even worse, where incumbents retain power through wholesale election theft (Simpser, 2013; Egorov and Sonin, 2021). While this is in line with our theory, it is a problem that we have no genuine counterfactual scenario and are unable to distinguish our explanation of rarity of fraud in the United States election from mere correlation or chance.

The relative absence of fraud in presidential elections in the United States is indeed remarkable, especially given the controversies, polarization, and narrow margins of some recent elections.⁹ In particular, Donald Trump has claimed the possibility of

⁹The 1876 presidential election was a remarkable exception (Haworth, 1906; Rehnquist, 2007).

massive vote fraud in the 2016 and 2020 presidential elections, which he won and lost, respectively. These claims prompted extensive investigations, yet no compelling evidence of systematic election fraud has been found for either election (for 2016, see [Cottrell, Heron and Westwood, 2018](#); for 2020, see [Eggers, Garro and Grimmer, 2021](#); see [Wu et al., 2024](#) for evidence on the absence of fraud in the state of Washington in 2011-18). In 2020, judges, including those appointed by Republicans, rejected 100 percent of lawsuits alleging election fraud (more than 30 in total) that were filed on behalf of the defeated candidate.

It is worth emphasizing that election fraud that can alter election results is not outside the realm of possibility in the United States. In fact, incidences of such fraud have been documented in elections at the sub-national level. For example, [Caro \(2011a\)](#) provides detailed historical evidence showing that the 1949 Senate race in Texas was stolen by the eventual winner, future US President Lyndon Johnson. The first volume of Johnson's biography, [Caro \(2011b\)](#), contains evidence that the 1941 Senate race was stolen as well, this time from Johnson. When such fraud occurs, the collected evidence points to a mechanism of fraud that is fully consistent with our theory: candidates steal votes in those counties where they possess substantial advantage over their opponents (for example, Parr County in the 1949 Texas election, [Caro, 2011a](#)).

In the remainder of this Section, we discuss the implications of our model, both normative and positive, its relevance to the current discourse surrounding the National Popular Vote Interstate Compact, and the robustness of the results.

Normative implications. The idea of replacing the electoral college with a system that reflects the popular vote is more than a theoretical possibility. Although completely eliminating the electoral college would likely necessitate a constitutional amendment, which is unlikely to happen in the foreseeable future, alternatives proposals have been put forward that would effectively implement the outcome of the popular vote. One notable

example is the National Popular Vote Interstate Compact, which entails an agreement among states (and the District of Columbia, which also has electoral votes) to allocate their electors to the candidate who wins the popular vote. The Interstate Compact is designed to come into effect once the number of electoral votes possessed by participating states reaches 270, which is the minimum required to enforce the outcome of the election; as of June 2023, this number equals 205. The constitutionality of the Interstate Compact remains unsettled (Brody, 2013), yet this idea is arguably the most viable approach to emulate the popular vote system (Keyssar, 2020).

This paper is applicable to analyzing the trade-off between the existing electoral college system and the proposed Interstate Compact. Notably, under both systems, each state remains responsible for determining its delegation to the electoral college, whereas certain additional changes that could be implemented as part of the switch to the popular vote system, such as a national election commission or federal enforcement of electoral laws, are not part of consideration under the Interstate Compact. Our theory, therefore, suggests that the Interstate Compact system would likely be more prone to election fraud than the existing system. Although one would expect current swing states to lose significance as sources of fraudulent votes, widespread fraud in states where one party enjoys overwhelming support, such as California and Illinois for Democrats or Texas and Tennessee for Republicans, could become a real possibility. An implication of this paper is that implementing a popular vote system while entrusting the counting of votes to local authorities may create a system that is particularly vulnerable to fraud.

Our model also speaks to the effects of polarization, and the predictions are largely “negative,” suggesting that polarization does not change the preferred electoral system. In other words, if the objective is to deter electoral fraud and if there are indications that the current electoral college system has been effective thus far, the increasing polarization of recent years, both within states and between states, does not provide a compelling reason to switch to a popular vote system, as follows from our theory.

Positive implications. Our motivating example in the Introduction suggests that in 2020, the electoral college might have been instrumental in protecting the election against fraud because it essentially compelled the losing candidate, Donald Trump, to seek fraudulent votes in states like Arizona and Georgia where obtaining such votes would be significantly challenging. Interestingly, Donald Trump and some of his associates, while failing to “find the votes,” propagated the opposite narrative. They argued that the election outcome was actually fraudulent, alleging that Democrats had committed fraud in several states, Arizona and Georgia in particular. This narrative has been proven to be false and while some errors and irregularities are probably unavoidable, the scale could not be large enough to affect the election in this particular case (Eggers, Garro and Grimmer, 2021).

The logic of our paper suggests why such fraud would be highly implausible *even from a theoretical standpoint*. For individuals willing to commit fraud in favor of Democrats in Arizona and Georgia, it would be natural to expect that such attempts would be put in check by numerous Republicans holding statewide and local offices in these states. In fact, investigations into alleged fraud were conducted and Republican officials, in addition to being motivated by their own interests, were under intense pressure from candidate Trump. The fact of these investigations underscores the point that stealing votes or other forms of electoral fraud is exceptionally difficult and risky in swing states. Even if one believes in all-powerful machines that deliver the vote in places like New York or Illinois, the electoral college system makes these machines irrelevant for presidential elections.

Extensions. In this paper, we made numerous simplifying assumptions to convey the point in the simplest way possible. Nevertheless, the main implications appear to be robust to a number of alternative assumptions outside of the present model.

So far, our analysis has focused solely on aggregate shocks that impact all states uni-

formly. Of course, state-specific shocks δ_j that affect individuals in state j only are also possible. In the simplest case where such shocks are i.i.d. across states (and, to make things even simpler, each shock is uniformly distributed with mean 0), this is mathematically equivalent to an increase in polarization between states and, therefore, is covered by Proposition 5. Specifically, this would not change the comparison between the two electoral systems we consider. The intuition that state-specific shocks should not affect the feasibility constraint under the electoral college system and the budget constraint under the popular vote system holds in this case as well. And it is the relative “tightness” of these two constraints that determines the superiority of one electoral system over the other.

One could object to our assumption that the party attempting to steal an election already knows the “fair” vote count, enabling them to strategize accordingly. We believe that this is a good first approximation, as parties have access to local representatives, internal polls conducted prior to election day, turnout data, and exit polls. Such data are necessarily imperfect, requiring potential fraudsters to allocate their efforts based on incomplete information. Regardless of how one conceptualizes or models the information available to parties, imperfect information makes it relatively more difficult to commit fraud under the electoral college system than under the popular vote system. Indeed, under the former, lack of information requires committing fraud in more states than necessary as a precautionary measure. Under the popular vote system, a stolen vote has value no matter where it is stolen. Consequently, if anything, imperfect information at the time of committing fraud is likely to make the electoral college system relatively more effective in deterring fraud compared to the popular vote system.

Finally, there exist numerous potential methods of fraud in addition to direct miscounting. These include ballot stuffing, having people vote multiple times, reducing the vote for the opponent through the physical disposal of ballots, failing to deliver ballots from precincts with high expected share of votes for the opponent, voter intimidation,

etc. (Hasen, 2020). These methods are different in terms of costs, coordination efforts required, the likelihood of being caught red-handed, or detection using statistical methods. However, as long as the main assumption of our paper is true, specifically that organizing fraud is easier in a favorable jurisdiction, as in Caro (2011*a*), we should expect that the key findings of this paper remain true and the implications of this paper remain relevant.

Conclusion

From time to time, and certainly in the wake of close presidential elections such as those in 1960 and 2000, the possibility of vote fraud in the United States elections is discussed. The recent elections of 2016 and 2020 have not been an exception, with a major candidate making the possibility of fraud a prominent talking point before and after the elections. The drawbacks of the electoral college system as a whole are also frequently raised, and given the current state of polarization in the United States, opinions on the electoral college versus the popular vote systems appear to be deeply divided as well.

We argue that the electoral college works as an institution that disincentivizes election fraud. Under electoral college, fraud makes sense only in those states in which election results were close and, therefore, it is natural to expect an evenly divided electorate. Stolen votes are difficult to obtain, as the opposing party is well represented in all elected and administrative bodies of the state and is spending money and efforts to combat fraud right here. In contrast, under the popular vote, efforts of each party would be concentrated in the states where they have near-complete dominance, such as Alabama for Republicans or Massachusetts for Democrats recently. Our model allows to compare the two electoral systems in a unified setting and demonstrates that the electoral college provides better protection against election fraud.

While motivated by the debate about the electoral college in the U.S., our theory has

direct implications for other common electoral systems. In countries such as France or Brazil, the chief executive is the president who is elected by a nationwide popular vote. In other countries, such as the UK or Germany, the executive power is vested in the prime minister, who is essentially elected by the parliament (the House of Commons and the Bundestag, respectively). Abstracting away from existence of small parties and coalition formation, a party's leader becomes a prime minister if they win a majority of votes in a majority of districts, which roughly corresponds to the electoral college system in the U.S. Our logic, therefore, suggests that parliamentary systems are more resilient to voter fraud than presidential ones, as conducting fraud would necessitate doing so in competitive areas. In contrast, presidential systems are inherently more fraud-prone, with the U.S. being the exception because of the electoral college.

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