Political Reform and Moderation in California's Legislature

Technical Appendices

CONTENTS

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Appendix A: Ideology Measures

This report uses three different measures of ideology. Each is derived from roll call votes on the chamber floor (i.e., excluding votes in committee), but each also uses slightly different inputs and methods of aggregation.

Shor/McCarty scores

Shor/McCarty scores (Shor and McCarty 2011) seek to identify a measure of ideology for state legislators that occupy a *common space*—that are comparable across states so that two legislators with the same score generally hold the same ideological positions on average. Identifying a common space for state legislators from roll call votes is challenging because each legislature votes on a different set of bills. If one legislature votes on many bills where liberals and conservatives take different positions, and another votes on bills that highlight other sources of difference between legislators, a grouping of legislators based on those who voted together frequently would accurately identify liberals and conservatives in the first legislature but not in the second. Moreover, without a clear theory about how the votes in each chamber related to each other, it would be difficult to say which legislature provided clear evidence of ideology and which did not.

The typical solution to this problem is to find *bridge actors* who make decisions in multiple settings. Shor and McCarty use responses to Project Vote Smart's National Political Awareness Test, a survey about current issues sent to every candidate running for state legislature across the country. Those that respond to the survey and end up serving in their state legislature are bridge actors because they offer responses to a common set of questions for multiple states. Shor and McCarty generate an ideological score—an *ideal point*—based on the responses to those binary questions.

If all serving state legislators responded to the NPAT survey, it would be possible to use this NPAT score as a measure of ideology. But the response rate is between 30 and 50 percent, leaving incomplete coverage. To address this issue, Shor and McCarty derive similar ideal points for the entire population of legislators who served in office using the yeas and nays on roll call votes. The roll call scores are then projected into NPAT space by regressing the NPAT scores on the roll call scores and imputing NPAT scores for the legislators who did not respond to the survey.

The ideal points themselves are derived from a basic quadratic utility model. Imagine n legislators taking positions on m different binary decisions (e.g., roll calls or survey items). Let $y_{ij} = 1$ if legislator i takes the "yes" position on decision j and $y_{ij} = 0$ otherwise. The value, or *utility*, that a legislator places on a particular outcome can be expressed as a function of the legislator's squared distance from the outcome in an s-dimensional policy space:

$$U_i(y_j = 1) = -\sum_{\boldsymbol{k=1}}^{s}(x_{ik} - \zeta_{jk})^{\boldsymbol{2}} + \eta_{ij} \qquad \text{(A1)}$$

$$U_i(y_j = 0) = -\sum_{\boldsymbol{k=1}}^{s}(x_{ik} - \psi_{jk})^{\boldsymbol{2}} + \upsilon_{ij} \qquad \text{(A2)}$$

where x_{ik} is legislator i's *ideal point* in dimension k of the policy space, ζ_{jk} and ψ_{jk} are the positions of yeas and nays in that dimension, and η_{ij} and υ_{ij} are stochastic errors. It can be shown that this basic framework reduces to an item response theory model, which can be specified and estimated with probit:

$$P(y_{ij} = 1) = \boldsymbol{\Phi}\left[\sum_{\boldsymbol{k=1}}^{s}(\beta_{jk}\, x_{ik} - \alpha_{jk})\right] \qquad \text{(A3)}$$

where $\boldsymbol{\Phi}(.)$ is the normal distribution function (Clinton et al. 2004). In the original psychometric application of item response theory, these various parameters reflected the interaction of student ability and test design (Gelman and Hill 2014). In the legislator application, these parameters serve similar functions but with different substantive meanings. The α_{jk}'s are the positions of the roll calls in the policy space. The β_{jk}'s indicate the *directional distance* between a yea and a nay—i.e., the direction and magnitude of difference in ideological meaning between the two choices, and so the ability of the decision to differentiate legislator ideology. (Because the probit model fixes the error term for the purposes of identification, these β_{jk}**'s** can also be considered a measure of the error with which a given roll call vote reveals legislator ideal points (Poole 2005).) But the most important parameters in A3 are the x_{ik}'s, which are the legislator ideal points in dimension k. For the sake of the analysis here, all other parts of A3 are nuisance parameters.

As specified above, the model is unidentified because any arbitrary rotation or translation of the ideal points would not change the distance between the ideal points and the decision items. The typical solution to this problem is to designate a priori ideal points for $k + 1$ legislators, making sure to choose those who are understood to be far apart on each of the dimensions of difference. The model is then estimated with either iterative maximum likelihood or Bayesian Markov Chain Monte Carlo (MCMC) simulation.

In the case of Shor/McCarty scores, the computational complexity requires that they use all NPAT and roll call information from a legislator's entire career in a particular legislative chamber to estimate the ideal points. That means that each legislator is assigned a fixed score that does not change over time. For this reason, the analysis in the main text captures change over time by looking only at legislators who were newly elected after the reforms.

Adjusted Chamber of Commerce scores

Like many advocacy organizations, the California Chamber of Commerce identifies a set of bills it wants to take a position on and then scores individual legislators according to whether they took the Chamber's position on those bills. A legislator's average support level offers some sense of his or her support for the Chamber's agenda in a given legislative session, as well as his or her conservatism on business regulation and taxation issues more generally.

These scores suffer from a version of the same problem as the Shor/McCarty ideal points: there is no guarantee that the bills that are scored have a consistent meaning over time. The bills available to score might be more or less conservative on the underlying business regulation and taxation issues; the Chamber itself might also vary the bills it wants to score for the sake of messaging or political coalition-building. More generally, if one imagines some underlying dimension that captures conservatism on business regulation and taxation issues, then the meaning of support for the chamber's position can change in a liberal or conservative direction across all bills (a shifting) or it can change in one way for some bills and in another way for others (stretching).

In this report I use the solution to this problem proposed by Groseclose, et al. (1999). Groseclose, et al. estimate shifting and stretching parameters and then adjust for them to place all the scores on a common scale. The translation is akin to changing a temperature from Fahrenheit to Celsius, where one first subtracts 32 (the shift parameter) and then multiplies by 5/9 (the stretch parameter).

More formally, let y_{it} be the observed (*nominal*) Chamber of Commerce score in year t, and let a_t^c and b_t^c be the shift and stretch parameters, respectively, for chamber c in year t. The *adjusted* Chamber of Commerce score $\hat{y}_{it}$ is

$$\hat{y}_{it} = \frac{y_{it} - a_t^c}{b_t^c} \qquad \text{(A4)}$$

Groseclose, et al. estimate the a_t^c and b_t^c parameters with a linear model using iterative maximum likelihood:

$$y_{it} = a_t^c + b_t^c x_i + \varepsilon_{it} \qquad \text{(A5)}$$

In this model, x_i is the mean weighted average of the adjusted scores for legislator i. It is akin to the static ideal point estimated in the Shor/McCarty model. However, in this model it is largely a nuisance parameter, since the values that matter are the $\hat{y}_{it}$'s. Moreover, Equation A3 also includes an error term ε_{it} that is uncorrelated with the legislator's past or future errors or with the errors of other legislators. This allows legislator scores to vary over time, making it possible to conduct analysis with the same legislators in more than one legislative session instead of limiting the data to newly-elected legislators in each year.

DW-NOMINATE scores

The basic theoretical basis of DW-NOMINATE is very similar to that of the Shor/McCarty ideal points described above, but it differs in three notable respects. First, it assumes a normal rather than a quadratic utility function. This is more computationally complex but might better reflect experimental evidence of decision-making (Poole 2005). This normal utility function produces the following probability of choosing the "yes" option on decision j:

$$P\left(y_{ij} = 1\right) = \mathbf{\Phi}\left[\beta\left\{exp\left(-\frac{1}{2}\sum_{k=1}^{s} w_k d_{ijk\zeta}^2\right) - exp\left(-\frac{1}{2}\sum_{k=1}^{s} w_k d_{ijk\psi}^2\right)\right\}\right] \qquad \text{(A6)}$$

where $d_{ijk\zeta}^2 = (x_{ik} - \zeta_{jk})^{\mathbf{2}}$ and $d_{ijk\psi}^2 = (x_{ik} - \zeta_{j\psi})^{\mathbf{2}}$. This model also has one global discrimination parameter β and one weighting parameter w_k for each dimension, rather than individual weights for each roll call in each dimension.

The second difference is that DW-NOMINATE uses a different estimation procedure. It starts by assigning initial ideal point values through a technique similar to factor analysis (see Poole 2005 for details). Then it cycles through a series of maximum likelihood estimation routines:

1) Estimate the parameters in the utility function parameters—the β's and w_k's—with the legislator and roll call parameters held fixed.
2) Estimate the roll call parameters—the ζ_{jk}'s and $\zeta_{j\psi}$'s—with the legislator and utility function parameters held fixed.
3) Estimate the legislator ideal points—the x_{ik}'s—with the roll call and utility parameters held fixed.

After reaching the end of routine 3, the process starts over with these new values and iterates through until the algorithm reaches convergence.

Finally, and most significantly, DW-NOMINATE is designed to estimate change in a legislator's ideal point over time. It achieves this by modeling each legislator's ideal point as a polynomial function of time:

$$x_{ikt} = \chi_{ik0} + \chi_{ik1}T_{t1} + \chi_{ik2}T_{t2} + \cdots + \chi_{ikv}T_{tv} \qquad \text{(A7)}$$

where v is the degree of the polynomial, the χ_{ik}'s are coefficients of the polynomial, and the time-specific T's are Legendre polynomials. The Legendre polynomials are chosen in place of a simpler approach—such as powers of time—to ensure that the linear and quadratic terms are orthogonal. In the estimation process described above, the initial definition of the parameters assigns a set of global ideal point values for a legislator's entire career, and then the time variance is estimated in every subsequent pass through step #3.

To identify the model and simplify the math, the global ideal points are constrained to the unit hypersphere. After incorporating the time variance described in Equation A7, a given legislator's ideal point can drift slightly outside this range.

Appendix B: Additional Analysis

Proposition 25 budget threshold change

There was one additional reform that might possibly have affected moderation. On the same ballot as Proposition 20 voters also approved Proposition 25, which lowered the legislative threshold for passing the state budget from two-thirds to 50 percent, effectively ending the need for Republican votes in subsequent budget negotiations. The lower threshold has certainly made it easier to pass the budget. Before the change, budget negotiations were long and tense and routinely extended into the new fiscal year. Since the change, negotiations have entailed far less drama and budgets have all emerged from the legislature by the deadline.

It is not as clear why the change would affect moderation. It is possible that the absence of a bipartisan vote would expose swing Democrats to the political pressures of voting for the budget, thus encouraging them to take more moderate positions on other issues. The lower threshold might also have increased the incentive for conservative donors to give money to moderate Democratic candidates in the hopes of moving the pivotal vote on the budget to the right.

The threshold change came two years earlier than the other reforms considered here, so the simplest way to test its role is to rerun the results from above with 2010 rather than 2012 as the key reform threshold. The results of this test are in Table B1. They make the Democratic caucus appear slightly more *liberal* and the Republican caucus somewhat more *conservative* after the reform. This casts doubt on the budget threshold change as a cause of greater moderation.

TABLE B1

Shor/McCarty scores with budget threshold adoption as key reform threshold

	Pre-reform average	Post-reform average	Difference (Post –Pre)	Difference without Redistricting
Democrats	-1.61	-1.56	-0.05	-0.06
Republicans	1.31	1.44	0.13	0.23*

SOURCES: Shor/McCarty Measuring American Legislatures ideal point data; Chris Tausanovitch and Chris Warshaw (district presidential vote 2008); Daily Kos (district presidential vote 2012).

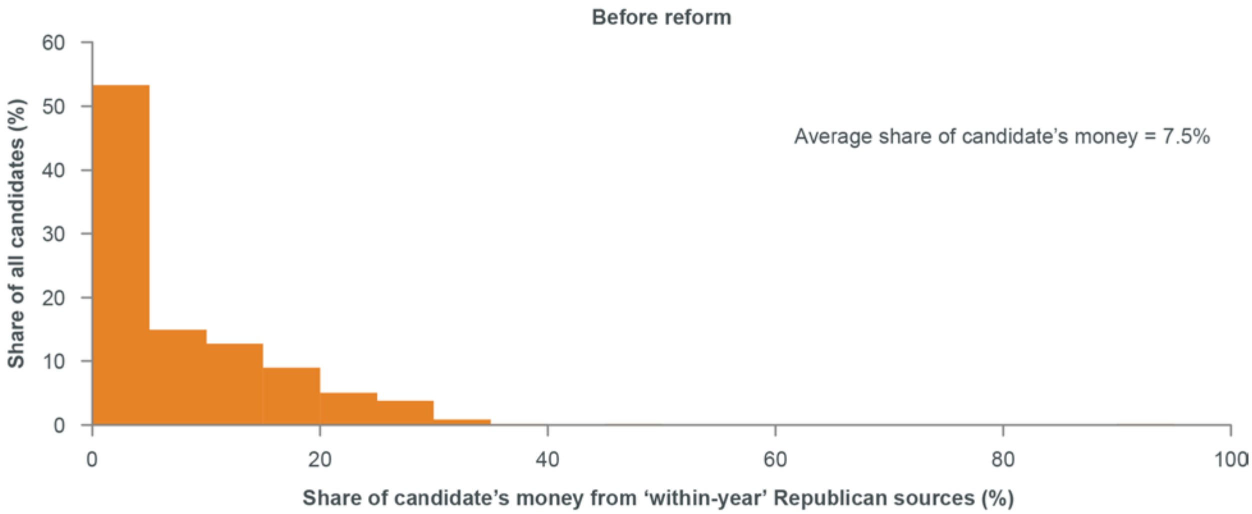
NOTES: "Ideology Scores" come from Shor/McCarty ideal points, derived from roll call votes projected into a common ideological space created by the surveys from Project Vote Smart.

* Statistically significant at 95% confidence level

Additional campaign finance graphs

FIGURE B1

Figure 3 campaign finance calculations using data from the same election cycle

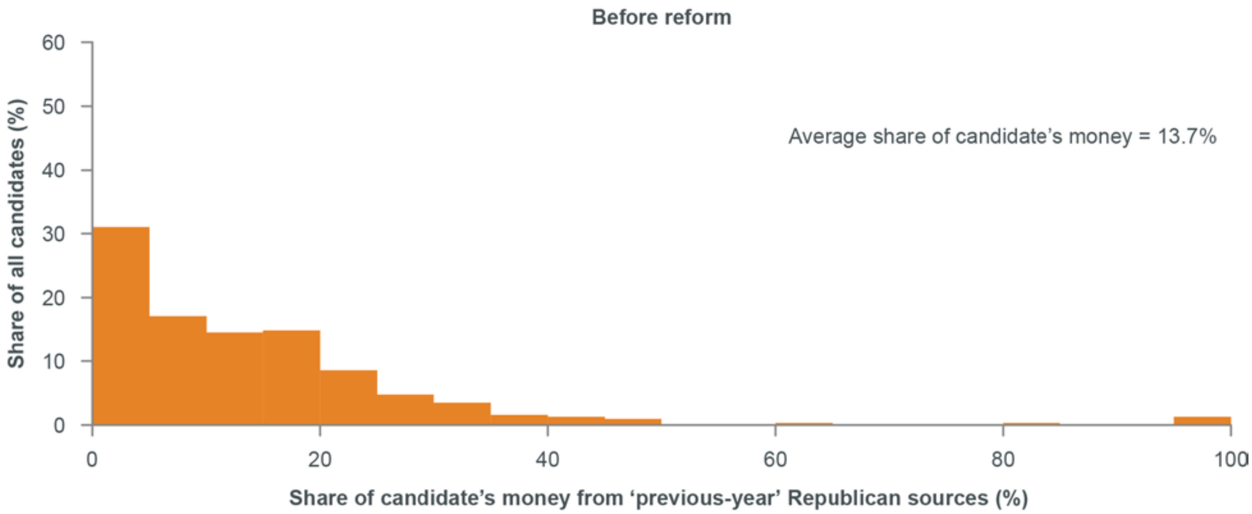


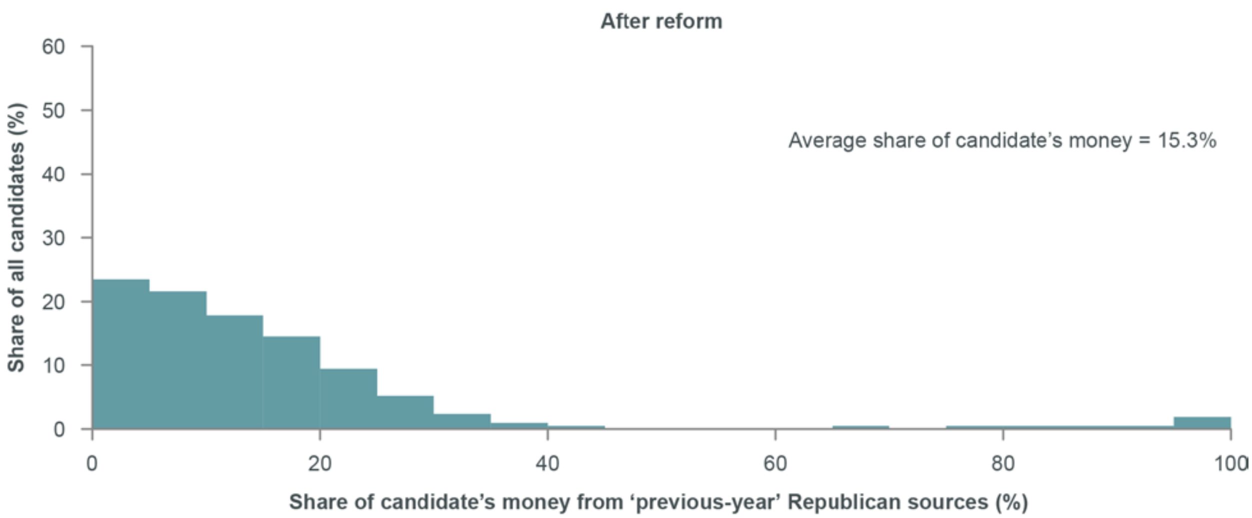
SOURCE: National Institute on Money in State Politics; California Secretary of State.

NOTE: Data cover legislators elected from 2004 through 2014. In these graphs, a particular source of money for a particular candidate is considered more or less Republican based on the share of that donor's money that was given to Republican candidates in the same election cycle. This ensures that every donor can be assigned a value. However, if the reforms made every donor more Democratic, it could partially obscure that change.

FIGURE B2

Figure 3 campaign finance calculations, open seats only



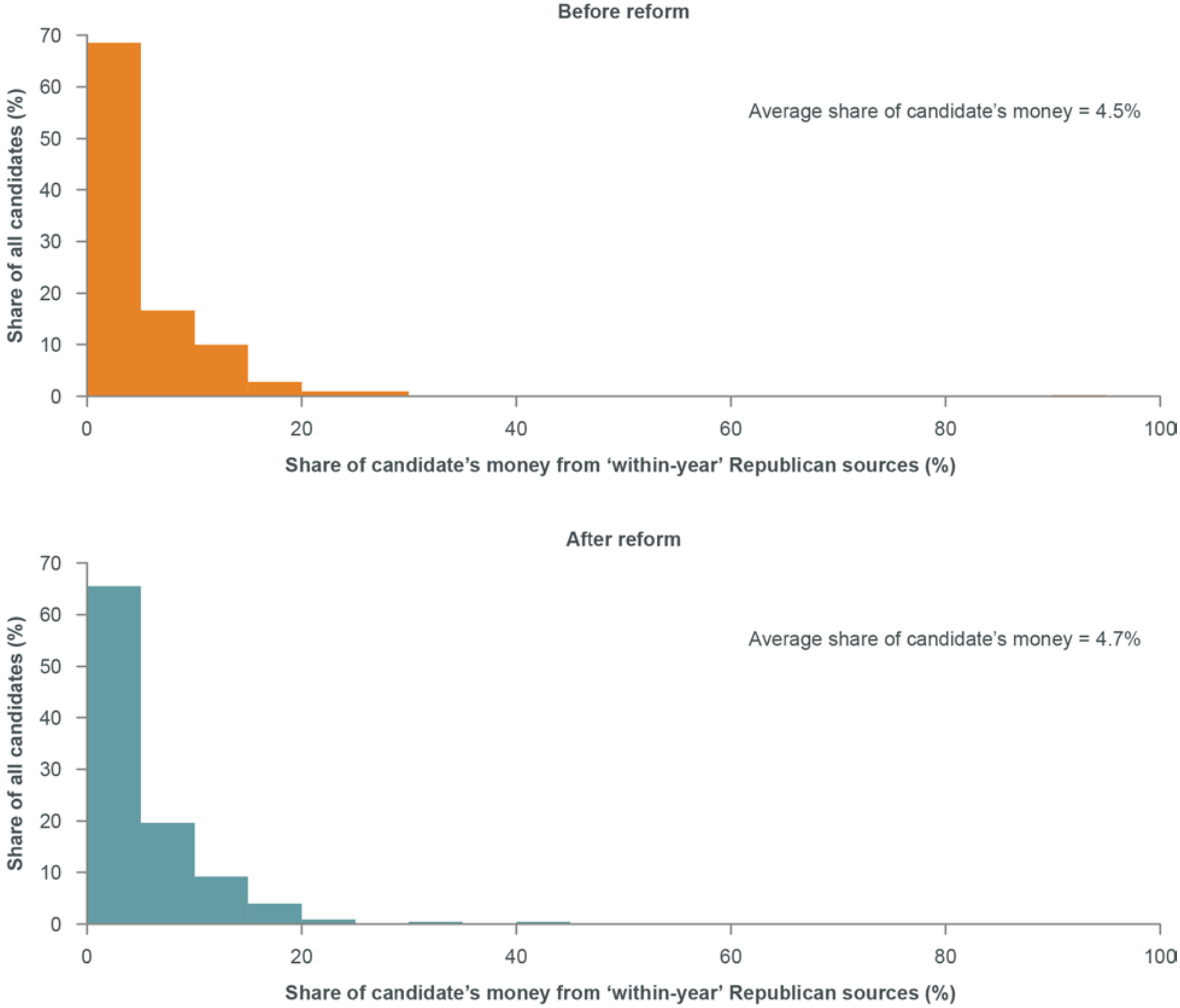


SOURCE: National Institute on Money in State Politics; California Secretary of State.

NOTE: Data cover legislators elected from 2004 through 2014. In these graphs, a particular source of money for a particular candidate is considered more or less Republican based on the share of that donor's money that was given to Republican candidates in the previous election cycle. This ensures that donors are defined by their behavior prior to the election in question. However, it prevents assigning a score to any donor who gave money in just one election cycle.

FIGURE B3

Figures B1 campaign finance calculations, open seats only

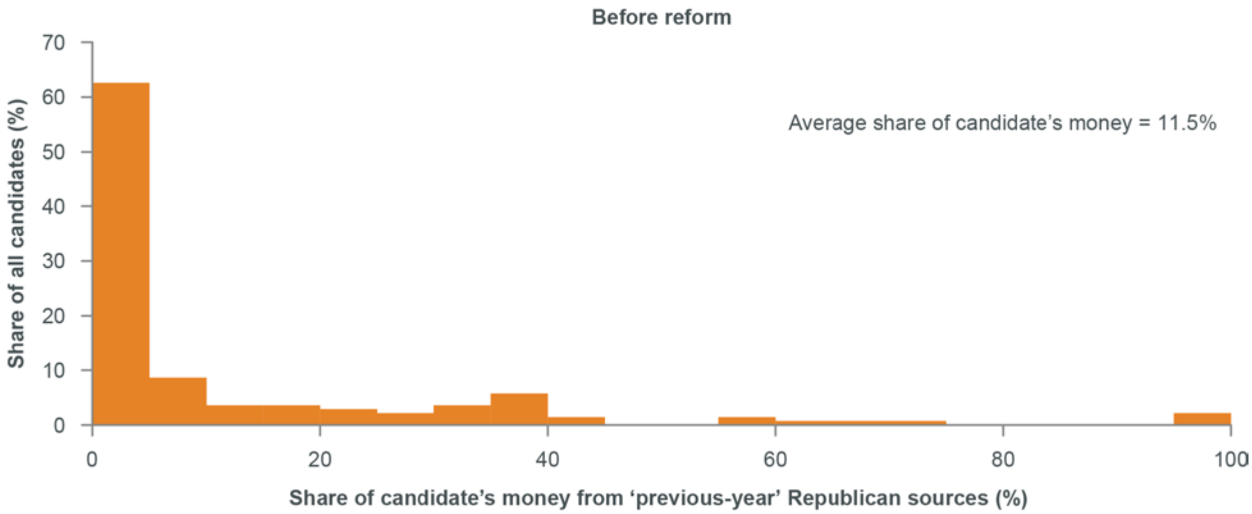


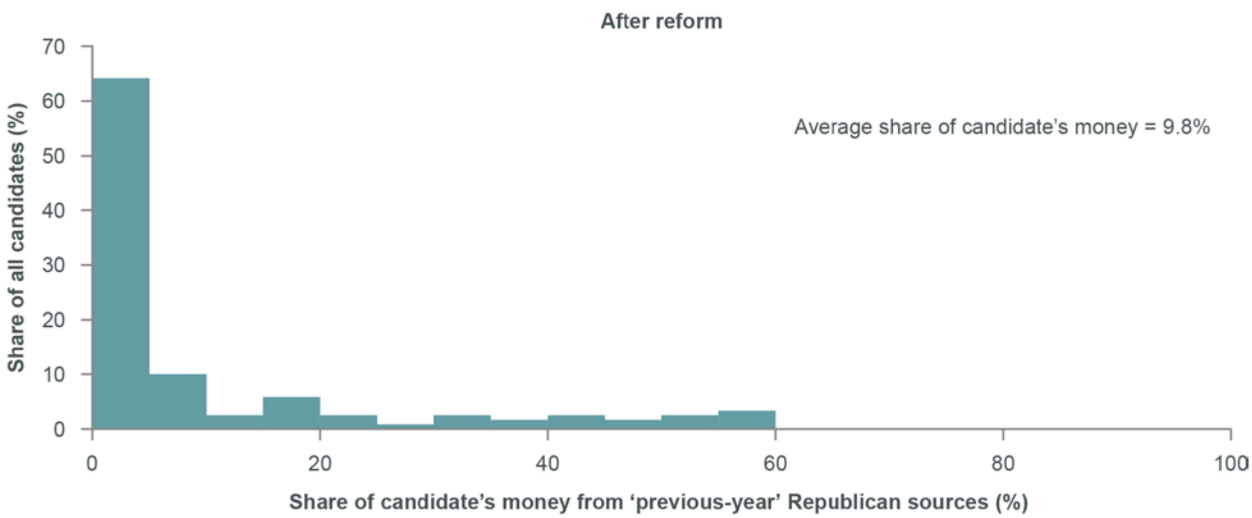
SOURCE: National Institute on Money in State Politics; California Secretary of State.

NOTE: Data cover legislators elected from 2004 through 2014. In these graphs, a particular source of money for a particular candidate is considered more or less Republican based on the share of that donor's money that was given to Republican candidates in the same election cycle. This ensures that every donor can be assigned a value. However, if the reforms made every donor more Democratic, it could partially obscure that change.

FIGURE B4

Figure 3 campaign finance calculations, independent expenditures only



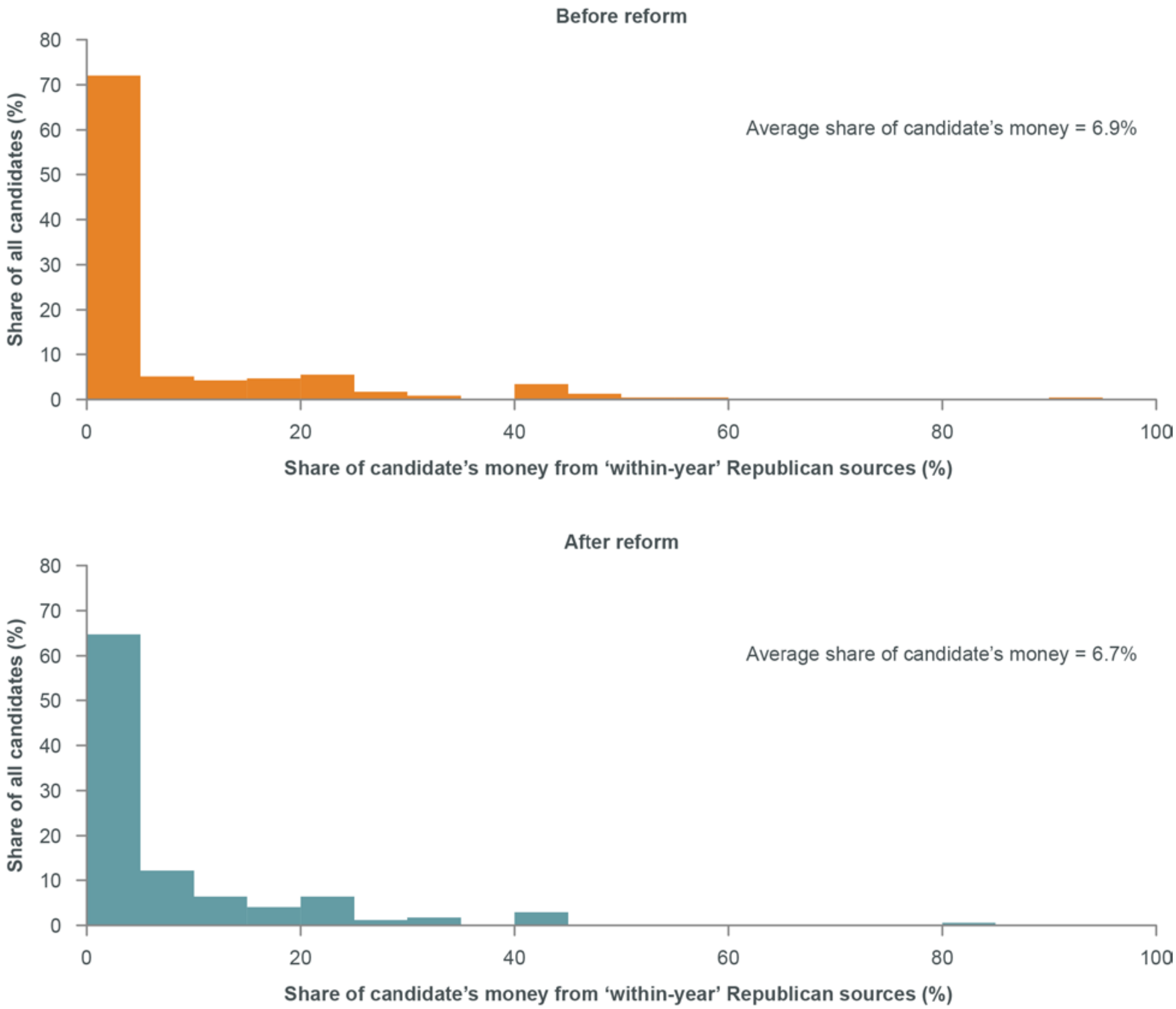


SOURCE: National Institute on Money in State Politics; California Secretary of State.

NOTE: Data cover legislators elected from 2004 through 2014. In these graphs, a particular source of money for a particular candidate is considered more or less Republican based on the share of that donor's money that was given to Republican candidates in the previous election cycle. This ensures that donors are defined by their behavior prior to the election in question. However, it prevents assigning a score to any donor who gave money in just one election cycle.

FIGURE B5

Figure B1 campaign finance calculations, independent expenditures only



SOURCE: National Institute on Money in State Politics; California Secretary of State.

NOTE: Data cover legislators elected from 2004 through 2014. In these graphs, a particular source of money for a particular candidate is considered more or less Republican based on the share of that donor's money that was given to Republican candidates in the same election cycle. This ensures that every donor can be assigned a value. However, if the reforms made every donor more Democratic, it could partially obscure that change.

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