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Source: *Legislative Studies Quarterly*, Vol. 11, No. 1 (Feb., 1986), pp. 75-90
Published by: Comparative Legislative Research Center
Stable URL: http://www.jstor.org/stable/439910
Accessed: 03-03-2015 22:41 UTC

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The Swing Ratio: An Explanation And an Assessment

The swing ratio—the percentage change in legislative seats associated with a 1% change in legislative votes—has been defined in two quite different ways. We discuss the properties, advantages, and disadvantages of each definition, along with the considerable difficulty of gathering appropriate data for use with either definition. The more familiar "historical" definition has a number of problems; one of its forms should rarely be used and the other form should be used with care and caution. The single-year or "hypothetical" definition has much to recommend it despite what initially appear to be serious defects.

It is true by definition that in non-proportional-representation political systems, parties often do not win the same percentage of votes and seats. It is very common, in fact, for large parties to be overrepresented in the sense of obtaining a larger percentage of seats than votes and for small parties to be underrepresented. Yet the relationship between votes and seats won is far from constant. In U.S. congressional elections, for example, the Democrats won almost exactly the same percentage of the two-party vote in 1954 and in 1962 (52.5% and 52.6%, respectively). Yet they won 53.3% of the House seats in 1954 and 59.3% in 1962. In dynamic terms, the Democrats lost virtually identical proportions of the vote between 1914 and 1916 and between 1954 and 1956. In the first instance they lost 3.3% of the seats, while in the second they actually gained .5%.

The translation of votes into seats is, first of all, an interesting intellectual puzzle. There is debate, for example, over whether this translation takes on the specific form known as the "cube law" and, if so, why (see Taagepera, 1984, and numerous references therein). There is also debate over whether the votes-seats relationship in U.S. House elections has declined in recent decades (Tufte, 1973; Burnham, 1974; Ferejohn, 1977; Pothier, 1984; Jacobson, 1985) and, if so, why it has changed and what the implications of the change are.

The swing ratio (as the votes-seats relationship is now commonly called) is perhaps even more significant, however, because it is potentially applicable in policy evaluation, specifically in assessing the quality of legislative

districting. Tufte (1973), Niemi and Deegan (1978), Grofman (1985), Niemi (1985), and others have suggested that districting plans cannot be fully evaluated on a district by district basis; rather, a districting plan must also be evaluated as a whole. For this purpose, how votes are translated into seats is a crucial question.

To be useful, however, we have to solve the implementation problem: how should the theoretical concept be operationalized? The overall problem is two-fold. First, there are theoretical and practical questions about just how to count seats and, especially, votes. Second, there are two distinct definitions of the swing ratio in addition to a special case that sometimes passes for a third definition.

This article assesses how best to measure the swing ratio and the data that go into its calculation. What are the properties, advantages, and disadvantages of the various definitions of the swing ratio? How accurate are the data used to calculate it? We shall stress throughout that data questions and definitional questions interact in important ways. This perspective yields a more definitive conclusion about the appropriate way to measure the votes-seats relationship.

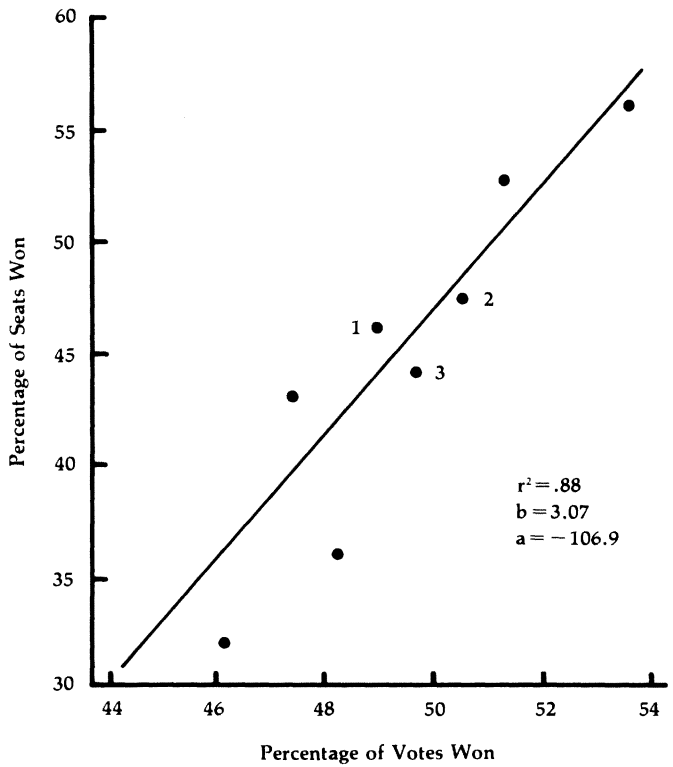
Definitions of the Swing Ratio

At a conceptual level there is agreement: the swing ratio is the percentage change in legislative seats associated with a 1% change in legislative votes. The problem is that there are two distinct operationalizations of this ratio and no guarantee that they will lead to the same conclusion in any given application. Each definition will be taken up in turn.

The Historical Swing Ratio

As its name suggests, the historical swing ratio is based on data from past elections. In its simplest form it is a bivariate linear regression of the percentage of seats won by a party in two or more elections on the percentage of votes won by the same party in the same elections. Figure 1 plots the results of a hypothetical series of elections. The ordinary least squares regression line through these points is the historical swing ratio. (The three numbered points will be referred to below.) Of course a linear regression sometimes leads to meaningless results at the extremes—predicting that a party would win less than none or more than 100% of the seats. A curvilinear form can be used to avoid this result, but in the range of most elections in two-party systems, a linear regression is adequate (Tufte, 1973, pp. 542-546). In studies dealing strictly with two parties, as here, the swing ratio (by any of its definitions) will be identical whichever party's vote and seat totals are used.

FIGURE 1
Hypothetical Plot of Percentage of Seats Won
By Percentage of Votes Won



The biyearly form. A special case of the historical swing ratio is based on only two elections and is therefore the real swing from one election to the next. It is simply the change in the percentage of seats held by one party in two successive elections divided by the change in the percentage of votes over the same period or, in equation form, $(\%\text{seats}_{t_2} - \%\text{seats}_{t_1}) / (\%\text{votes}_{t_2} - \%\text{votes}_{t_1})$.

Not surprisingly, one pays a high price for this simplicity. This argument can be visualized by reference to Figure 1. The swing ratio, the regression coefficient, is high and positive. But consider the points labelled 1 and 2. A regression through only these two points yields a far different result than the overall regression. Or consider points 1 and 3. A regression through these points yields a negative coefficient. If a negative swing ratio is anything but an aberration, one would have to conclude that a party

ought to lose votes in order to win seats. Nor are such results mere theoretical possibilities. Of the 59 biyearly swing ratios between 1866 and 1984 (calculated with the Stokes-Iversen data described below), there are seven negative values along with positive values of 20.9, 19.2, and 52.0.

In spite of these deficiencies, biyearly swing ratios should not be totally ignored. The wide fluctuations tell us that small changes in the percentage of votes may be rewarded with quite different changes in the percentage of seats. The negative values remind us that a small gain in votes may even be accompanied by a decline in the percentage of seats won. As an indicator of the general votes-seats relationship, however, the biyearly swing ratio is remarkably deficient. It should rarely if ever be used except to make the points just noted. Even when the focus is on a single pair of years, as in Abramowitz (1983), its extreme sensitivity to small changes in input makes its use questionable.

The multiyear form. The historical swing ratio, when measured over a number of points, is a considerable improvement over the biyearly form and, viewed theoretically, it is an excellent measure of the general relationship between votes and seats won. Yet in practice there are difficulties in using it. In one sense these difficulties tell us nothing more than the obvious fact that a regression line is affected by the points on which it is based. But the degree to which values of the swing ratio are affected by these variations is surprisingly large and the sources of the variability sufficiently difficult to understand, let alone control, so as to be highly disconcerting.

The simplest problem is that one must of necessity calculate the multiyear swing ratio over some specified period of time. One can, of course, calculate a single ratio over the entire period for which data are available; but when there is reason to believe that the values have changed systematically over the period, some division is required. The more finely time is divided, the smaller the number of points in each period. Reducing the number of points may also lead to more restricted variance in the percentages of votes and seats won. The resulting swing ratios will therefore be even more susceptible than usual to minor variations in the input. In addition, this makes it impossible to be confident about the size of the ratio in the "current" period until the current period becomes long enough for a moderate number of elections to have occurred.

A second difficulty stems from the existence of uncontested elections. The multiyear swing ratio can vary substantially, depending on how one counts the results in these districts. Consider an example. Indiana over the period 1972-1980 had a total of 55 congressional elections. Exactly one was uncontested. In District 9, the Democratic incumbent won contested elections in 1972, 1974, 1978, and 1980, each time winning between 63% and 71% of the vote. In 1976 he ran unopposed, winning 100% of a reduced

turnout. If one simply counts the votes as given (in Scammon and McGillivray, 1981, p. 147), the statewide Democratic vote in 1976 was 55.7% and the swing ratio for the decade was 4.25. One might argue, however, that this calculation misrepresents the situation because we can be very confident that if the Republicans had run a District 9 candidate in 1976 they would have cut into the Democratic vote total. Moreover, we can make a reasonable guess about what the outcome would have been. Hence, suppose that in 1976 there had been a normal turnout and a Democratic victory of usual proportions. In this case (135,000 Democratic and 75,000 Republican votes), the statewide Democratic vote in 1976 would have been 53.7% with a swing ratio of 4.75.

This case may be unusual in the regularity of results before and after the single uncontested election. Such a correction, even if desirable, might often be impossible. Moreover, in this instance, one might judge either swing ratio as "high" and the difference between them as insignificant. Yet a difference of .5 would be meaningful in some ranges, and the fact that it occurred when less than 2% of the elections were uncontested suggests that the problem cannot be ignored.

Another approach to handling uncontested elections is to exclude votes obtained in uncontested races. This seems rather inappropriate. Yet in effect it is sometimes done, since a few states do not record votes in such cases (Congressional Quarterly, 1983). In any event, if the Democratic vote for Indiana District 9 in 1976 is simply dropped, the statewide Democratic vote drops to 52.6% and the swing ratio rises to 4.84.

Yet a third problem in using the multiyear swing ratio is that values may differ significantly depending on the source of the seats and votes data. We calculated swing ratios over four "realignment periods," using two compilations (described below) of the nationwide congressional vote; identical figures were used for the two-party division of the seats. The general outline of the results is the same in both cases (Table 1). The swing ratio was highest in the second half of the nineteenth century, decreased after 1896, rose again during the New Deal realignment, and declined again after 1964. But the Stokes-Iversen data suggest that the swing ratio for the current period is almost the same as it was in the first third of this century; the Clubb-Austin data suggest that it has dropped noticeably.

In short, while the multiyear swing ratio is theoretically very attractive, its sensitivity to exact input values may create severe problems in actual practice. If it is used at all, care and caution is well advised.

TABLE 1
The Multiyear Swing Ratio in Four Realignment Periods, Derived from Two Sources of the Congressional Vote

Period	*Source of Congressional Vote*[a] Stokes-Iversen	Clubb-Austin
1866-1894	4.34	4.05
1896-1930	1.71	1.98
1932-1964	2.53	2.68
1966-1982	1.64	1.67

[a]For a description of these sources, see the section on "Existing Compilations."

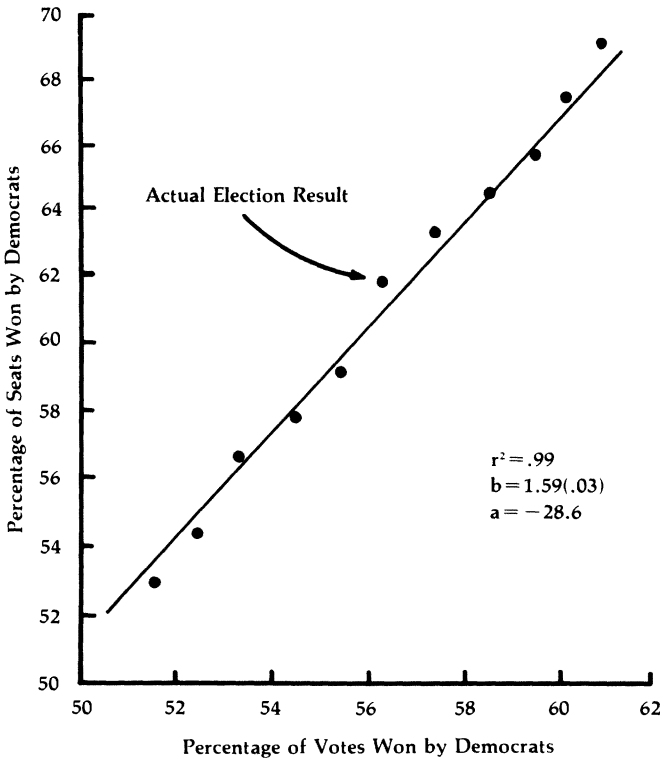
The Hypothetical (Single-Year) Swing Ratio

The hypothetical swing ratio is a linear regression over a number of points, usually 11. The first point is the actual percentage of votes and seats won by a party in a given election; the other points reflect how many seats that party would have won if it had gained or lost votes uniformly across all districts (Butler, 1951; Tufte, 1973).

An example makes this clear. In 1982, the Democrats won 56.5% of the two-party nationwide congressional vote and 61.8% of the seats. Those percentages define the coordinates of the first point (Figure 2). If the Democrats had won 1% more of the votes in each district, they would have won six (1.4%) more seats. If they had won 1% fewer votes in each district, they would have won 10 (2.3%) fewer seats. Consequently, in the first hypothetical case, the Democrats would have won 57.5% of the votes and 63.2% of the seats; in the second case, 55.5% of the votes and 59.5% of the seats. These points are also plotted in Figure 2. If we continue this process for ±5% of the vote and regress seats on votes for the resulting set of points, we obtain the hypothetical swing ratio.

The disadvantages of this definition of the swing ratio are obvious. One is the arbitrariness of generating outcomes within 5 points of the actual result. The rationale for using 5 points rather than some large number such as 20 or 30 is clear. Most election results occur in a fairly narrow range. Yet there is no justification for using exactly 5 points. There is also the assumption that gains are uniform across districts. It has long been known, for example, that partisan swings are more variable in the United States than in Great Britain (Stokes, 1967). Moreover, one of the points of recent congressional voting studies is the variability among districts in the visibility and evaluation of candidates (Mann, 1978).

FIGURE 2
The Single-Year (Hypothetical) Swing Ratio for 1982



One might also criticize the single-year swing ratio on the grounds that it is hypothetical. It is a measure of what might have been, not of what actually happened. Moreover, "what might have been" is surely affected by idiosyncrasies of each election and may therefore be questionable as a measure of a general votes-seats relationship. Tufte (1974, p. 212), for example, found a swing ratio of 1.76 in 1962 and 2.51 just two years later, the latter occurring in a period in which the general trend was toward lower ratios.

At first glance, these problems seem entirely to vitiate the hypothetical swing ratio. Upon closer inspection, they are not so serious. In addition, there are advantages of this definition that are real but less apparent. Consider each of the problems in turn. There is a useful alternative to basing the regression on an arbitrary number of points. As Tufte has done for selected states, we can plot the entire votes-seats curve, showing the percentage of votes required to win from zero to 100% of the seats. Such a

plot need not be linear, of course, and it shows precisely the (hypothetical) relationship between votes and seats won. One can readily determine (and summarize with regression results if one so chooses) whether there are regions around the actual vote results in which a party gains especially few or many seats for a given change in votes.

The uniformity-of-effect assumption and the hypothetical nature of the single-year swing ratio are not troublesome when one remembers that the ratio is meant to be a general measure of the relationship between votes and seats won. The hypothetical swing ratio measures what the effect on the number of seats would be either of electoral forces not directly controllable by the party (the state of the national economy) or of forces that are rather broadly and uniformly felt (nomination of an especially popular or unpopular presidential candidate).

What we seek is a summary measure that expresses the way in which institutional factors structure the translation of a given percentage of the vote into some percentage of the legislative seats. If what happened in a particular year is the focus, some sort of residual analysis (e.g., of deviations from the historical regression line or from the average hypothetical swing ratio) would be useful. It might even be appropriate to use the biyearly swing ratio. But typically a general measure is wanted. When we use the historical ratio we hope that election-specific factors somehow even out, giving us an accurate picture of the underlying relationship. With the hypothetical ratio, we try to measure that relationship directly. From this perspective, the fact that the hypothetical ratio captures uniform effects across districts is more of an advantage than a disadvantage. The starting point—the actual election result—reflects all of the systematic and idiosyncratic factors that determine that year's result. The swing ratio then taps additional (hypothetical) effects common across all districts.

As for variations across years, the hypothetical swing ratio is comparable to the historical ratio. The latter is a kind of average (as captured by a regression coefficient) of the votes-seats relationship across a number of years. As we noted earlier, that measure is potentially unstable when used with only a small number of points (especially two). In similar fashion, we can average (using the arithmetic mean) the single-year ratio over periods of time and should not expect the value for each year taken alone to be highly stable.

Aside from these ways in which the problems of the hypothetical swing ratio are not serious, this measure has two important virtues. First, it has the advantage that it does not depend on data from past elections, an important point in applications to districting. We are often interested in the effects of a districting plan after only one election. The historical ratio—based on elections under previous districting schemes—is not very useful.

Second, the hypothetical ratio is much less dependent than the historical on just how one counts certain votes. Uncontested races, for example, are no problem for the hypothetical ratio (except under highly unusual circumstances). What is important in this measure is not the starting point—the percentage of the votes won by a party—but the percentage of seats won or lost as votes are presumed gained or lost. Seats that are uncontested would not switch parties if the vote changed by 5% or even considerably more. If votes of Democratic winners are not counted in Louisiana or elsewhere, the nationwide Democratic vote is slightly underestimated, but the hypothetical swing ratio will not be altered. Seats that would change hands with small vote fluctuations are those in which the vote was very close to 50%. They will not be affected by whether or not votes were counted in uncontested elections, though measures of bias (Tufte, 1973, pp. 542-543) or neutrality (Niemi and Deegan, 1978) will be affected.

The importance of this point is apparent in the Indiana example. Recall that in one district the Democrats typically won about two-thirds of the vote but that in one year the seat was uncontested. Unlike the historical swing ratio, the single-year measure would be the same whether or not this district was contested (unless one computed the change over an especially large range).

A similar point can be made about crossparty endorsements and minor party endorsements of major party candidates. Candidates strong enough to capture the nomination of both major parties would presumably not lose a contested general election. Hence, these elections are essentially the same as other uncontested races. The overall vote tabulation is affected, but the single-year swing ratio is unaffected by a rather wide range of hypothetical gains and losses. In the case of minor party endorsements, the question is whether we should count votes for major party candidates cast on minor party lines. The decision affects the overall vote for a major party and therefore affects the historical swing ratio. With the hypothetical ratio, it is seats (hypothetically) won or lost that are significant, and seats are based on the total votes for a candidate, regardless of their source. Thus, the relevant numbers are all votes for the major party candidates. That the statewide or nationwide vote is modestly affected by this decision will not alter the value of the hypothetical ratio.

In sum, the hypothetical swing ratio has a number of virtues that distinguish it from the other formulas. That it is not a perfect measure should not be ignored. Yet it is an appropriate and possibly superior alternative to the historical definition.

Problems in Counting Votes and Seats

In evaluating different definitions of the swing ratio, we raised a number of data problems. Most importantly, we showed that the level of the historical ratio for Congress prior to 1930 varies significantly depending on which source of data one uses. This is surprising because we use only two seemingly simple pieces of information: the percentage of votes and the percentage of seats won by each party. Nevertheless, problems exist.

In this section we shall briefly review existing data on congressional votes and seats, discuss the differences among various compilations, and indicate possible sources of those differences. However, we cannot hope to account for all of the discrepancies and cannot provide a definitive answer to the question of which accounting is the most accurate. Indeed, as we have already hinted, the solution to the underlying problem may lie more in defining the swing ratio than in trying to perfect the input.

Existing Compilations

There are only two compilations of the nationwide popular vote for Congress covering the period since the Civil War. Stokes and Iversen (1962) compiled a list which begins in 1866. After 1896 the data are taken from the *Historical Statistics* (1975), so their list, though ending in 1960, is easily updated using U.S. *Statistical Abstracts.* The second list, compiled by Clubb and Austin (1984; Austin and Clubb, forthcoming), covers the period 1824 to 1976. It is based on data in the Congressional Quarterly's *Guide to U.S. Elections* (1975) and can be updated using Congressional Quarterly's election tabulations. Stokes and Iversen's list contains only Republican and Democratic votes; Clubb and Austin's compiles minor party votes as well.

The Democratic percentage of the two-party vote as calculated from each of these collections and the differences between the calculations are shown in Table 2. For the most part the differences are small. The largest is 2.7% (1924), and over two-thirds of the differences are 1% or less. Yet it is striking that through 1910 the Stokes-Iversen count is most often greater, while after 1910 the Clubb-Austin count is almost always higher. In a purely accounting sense, of course, these differences are what cause the variations in the two swing ratios. However, that does not explain the root of the problem, the systematic difference between the two records. Nor are the discrepancies limited to these two sources. Government publications (the *Historical Statistics* and the *Statistical Abstracts* for various years) contain different results for years since 1952, presumably having been updated in undocumented ways. For no apparent reason, there is also a discrepancy among volumes for 1920.

TABLE 2
Comparison of Two Compilations of the Nationwide Two-Party Congressional Vote, 1866-1976
(in percentage of vote for Democratic candidates)

Year	Stokes-Iversen	Clubb-Austin	Percentage Point Difference	Year	Stokes-Iversen-	Clubb-Austin	Percentage Point Difference
1866	45.2	45.6	-0.4	1924	42.1	44.8	-2.7
1868	47.5	46.5	1.0	1926	41.6	42.3	-0.7
1870	49.4	48.5	0.9	1928	42.8	44.4	-1.6
1872	46.1	46.0	0.1	1930	45.9	47.0	-1.1
1874	53.8	51.2	2.6		$\bar{x}_{Diff}$ = -.38		$\lvert\bar{x}_{Diff}\rvert$ = 1.20
1876	52.1	51.8	0.3				
1878	50.0	50.9	-0.9	1932	56.9	57.0	-0.1
1880	50.0	50.1	-0.1	1934	56.2	57.0	-0.8
1882	52.7	55.1	-2.4	1936	58.5	58.7	-0.2
1884	50.5	52.2	-1.7	1938	50.8	51.8	-1.0
1886	51.2	50.5	0.7	1940	53.0	53.7	-0.7
1888	50.4	49.6	0.8	1942	47.7	48.4	-0.7
1890	54.2	54.4	-0.2	1944	51.7	52.7	-1.0
1892	53.7	52.8	0.9	1946	45.3	45.9	-0.6
1894	44.5	43.7	0.8	1948	53.2	54.1	-0.9
	$\bar{x}_{Diff}$ = .16		$\lvert\bar{x}_{Diff}\rvert$ = .92	1950	50.0	50.6	-0.6
				1952	49.9	50.0	-0.1
1896	48.1	47.2	0.9	1954	52.5	52.7	-0.2
1898	50.5	49.2	1.3	1956	51.0	51.2	-0.2
1900	47.3	47.5	-0.2	1958	56.1	55.8	0.3
1902	48.7	47.8	0.9	1960	55.0	54.9	0.1
1904	43.7	42.3	1.4	1962	52.6	51.9	0.7
1906	46.5	45.0	1.5	1964	57.5	57.8	-0.3
1908	48.1	47.6	0.5			$\bar{x}_{Diff}$ = -.37	$\lvert\bar{x}_{Diff}\rvert$ = .50
1910	50.5	49.6	0.9				
1912	57.1	58.3	-1.2	1966	51.3	51.4	-0.1
1914	50.3	50.7	-0.4	1968	50.9	51.3	-0.4
1916	48.9	50.1	-1.2	1970	54.2	54.5	-0.3
1918	45.1	47.1	-2.0	1972	52.7	52.6	0.1
1920	37.7	40.0	-2.3	1974	58.6	58.5	0.1
1922	46.4	47.2	-0.8	1976	57.2	56.9	0.3
						$\bar{x}_{Diff}$ = -.05	$\lvert\bar{x}_{Diff}\rvert$ = .22

1866 - 1976 $\bar{x}_{Diff}$ = -.20 $\lvert\bar{x}_{Diff}\rvert$ = .81

An exhaustive analysis might explain some of these differences. The Cox (1972) and David (1972) volumes would help in this regard. Rather than attempting such a detailed study here, however, let us instead turn to some of the reasons why it is so difficult to arrive at an accurate count.

Problems in Determining Both Seats and Votes Won

An initial difficulty, especially problematic as one goes back in time, is determining just which candidates are Republicans and which are Democrats. One cannot simply rely on party labels. Of course, some initially vexing cases are easy to handle. In 1872, for example, there were nominally no Democratic candidates in many states (Congressional Quarterly's *Guide,* 1975, pp. 626-629), but the alliance between Democrats and so-called Liberal Republicans (Binkley, 1962, pp. 297-300) means that the latter can quite comfortably be called Democrats. This is especially so when one observes that individual Liberal Republicans of 1872 ran as Democrats in the elections just before and just after 1872.

Other cases are not so simple. What is one to make of Iowa in 1874, for example? The fact that Republicans were consistently opposed by Anti-Monopolists (not to be confused with the Anti-Monopoly Democrat who ran in Illinois in 1882), who won roughly the proportions of votes previously and subsequently won by Democrats, suggests that Anti-Monopolists were simply Democrats under another name. That interpretation is not so obviously correct, however, because none of the candidates in 1874 ran either before or after, because Anti-Monopoly candidates ran against both Republicans and Democrats in Nebraska in 1882, and because the Anti-Monopoly Party nominated its own presidential candidate in 1884. Or how should one handle Minnesota in the 1930s and 1940s when Farmer-Labor candidates opposed Republicans, sometimes alone and sometimes along with a Democratic candidate?

A thorough analysis of each ambiguous case would clarify many of them; David's (1972) proposals would help considerably. But considering that the Congressional Quarterly's *Guide* contains some 542 party labels (after approximately 1000 were eliminated because the candidates did not receive at least 5% of the vote), that would be a task of heroic proportions.

The same problem occurs in determining the number of seats won by each party. In this case the problem may actually be hidden somewhat by the fact that the party distribution in Congress is so readily available. In addition, it is easier to check ambiguous cases because there are fewer of them (i.e., one need not determine the party of losers). It is also likely that the problem is less severe because the party affiliation of most winners is relatively clear. Nonetheless, the problem cannot be ignored. The *Historical*

Statistics (1975) and *World Almanac* (1984) listings, for example, agree exactly on only 13 of 53 Congresses between 1866 and 1970. Of course some of the differences are tiny and are caused by such things as deaths between the time of the election and the opening of Congress. But some are surprisingly large in terms of the number of individuals, and the differences in percentages may be enough to alter the swing ratio.

Uncontested Elections and Multiple Endorsements

Uncounted votes, uncontested elections in general, crossendorsements, and minor party endorsements of major party candidates all create problems for anyone attempting to count statewide or nationwide Democratic and Republican vote totals. It is not clear how any of these problems were handled by Stokes-Iversen and Clubb-Austin. More important, it is not clear just how they should be handled.

These factors would be less significant if they were uniformly distributed across time and space. But such is not the case. Uncontested elections, for example, were more of a factor in southern than nonsouthern politics and were more frequent in the first half of this century than before or since. Yet there is variation around even that generalization. In 1918, for example, 103 seats were uncontested. Two years earlier the total had been 50, a number very similar to that in recent years. If this example suggests systematic variation between presidential and nonpresidential election years, that too is variable. In 1978 and 1980, the number of contested elections was much closer, 64 and 50, respectively. The significance of uncontested election is suggested by Burnham's (1974) calculation of the historical swing ratio for the period 1874-1972 with the South excluded. His 2.81 swing ratio contrasts with Tufte's figure of 2.39 for the entire country.

To further complicate matters, votes are not reported in some uncontested elections. In recent years there have been such cases in Florida and Louisiana (and earlier in Arkansas and Oklahoma). Even with only two states, however, there is variation in the number of such cases (between 8 and 12 since 1976) and in the party distribution of the winners.

Temporal variation is also a feature of crossendorsements. Two-party endorsement of candidates is a phenomenon that we associate primarily with California prior to 1959 (Scarrow, 1983, pp. 55-56). Indeed, in 1916 there were only five crossendorsements, and three of them were in California. Surprisingly, however, in 1918 there were 20 such cases, with 12 coming from New York, Pennsylvania, and Oregon. Nor are crossendorsements entirely a thing of the past. In New York there were five dual endorsements in 1978 and four in 1980. Minor party endorsements of major party candidates are even more rarely allowed, but they have been a regular feature of New York politics throughout this century (Scarrow, 1983, chap. 3).

Yet another small problem—strictly in the nineteenth century—is odd-year regular House elections (see Congressional Quarterly's *Guide* for 1867-1879).

In light of these problems of how to count seats and votes, we should perhaps marvel not at the fact that existing compilations differ but that there is as great an agreement as there is. Nonetheless, a thorough analysis of past and present swing ratios awaits adequate consideration of these factors.

Conclusion

A truly satisfying conclusion to this paper would be that one and only one definition of the swing ratio is suitable and that none of the data problems has any serious consequences for substantive interpretations. Unfortunately, neither of these statements follows from what we have said. Nevertheless, considerable progress has been made.

We have pointed out that the older, historical version of the ratio has a number of problems associated with it. From almost any perspective, the biyearly form is so unstable that it is wholly inadequate. For evaluation of districting plans, the appropriate historical data are not generally available. Other difficulties—the vote counting problems caused by uncontested or irregularly contested elections and by multiple endorsements—are practical rather than theoretical, but important nevertheless. Thus, we advise against using the biyearly swing ratio except in unusual circumstances and recommend care and caution in using even the multiyear form of the historical swing ratio.

Fortunately an alternative, hypothetical swing ratio is available and is immune to many of these problems. As with any other measure, it is not perfect. If nothing else, it is considerably more time-consuming to calculate. Moreover, it has not been used frequently, and its characteristics are not fully known. Nonetheless, from the point of view of theory, practicality, and applicability, it is a useful, and perhaps the best, operationalization of the swing ratio.

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NOTE

A previous version of this paper was presented at the annual meeting of the Public Choice Society, New Orleans, 21-23 February 1985. We would like to thank Nicholas Miller, Edward Tufte, and the anonymous referees for their helpful comments. The first author would like to acknowledge the support of The University of Iowa, where he was a visiting professor when this paper was written, and of the National Science Foundation (SES-8421050) for support when it was revised.

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