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Kenneth Alan Wink
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Partisan representational form and partisan bias in U.S. state lower-house legislative elections: A district-level approach

Wink, Kenneth Alan, Ph.D.
The Louisiana State University and Agricultural and Mechanical Col., 1992
PARTISAN REPRESENTATIONAL FORM AND PARTISAN BIAS IN U. S. STATE LOWER-HOUSE LEGISLATIVE ELECTIONS: A DISTRICT-LEVEL APPROACH

A Dissertation

Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Doctor of Philosophy in The Department of Political Science

by Kenneth Alan Wink
B.A., Northeast Louisiana University, 1984
M.A., Baylor University, 1987
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ABSTRACT

I explore the relationship between partisan votes and partisan seat allocation in U. S. state lower-house elections. Specifically, I measure the representational form (the rate of partisan seat changes given particular partisan vote changes) and partisan bias (asymmetry in the seats-votes relationship) of 441 lower-house state legislative elections in 46 states from 1968 to 1987. I then test a number of hypotheses that have been advanced to explain variation in representational form and partisan bias.

Values for representational form and partisan bias are generated by creating simulations from actual election results. I simulate seat gains made by Republicans given one percent uniform party vote swings across all districts and assuming Republicans would win between 35% and 65% of the mean district vote. After generating 31 data points for each election year, I use a logit equation to operationalize representational form and partisan bias for each election year in each state. These data then become dependent variables in pooled, cross-sectional time-series analyses used to explain variation in representational form and partisan bias across time and across states.

As in previous studies, I find that representational form is declining over time. I also find that representational form is a function of party competition across election districts. In elections having a large number of
competitive districts, there is a rise in the value of representational form. The size of election districts (by population) as measured by Taagepera's Index has a positive but substantively weak effect on representational form. Effective district magnitude (the existence of multimember districts) also has a positive but substantively weak impact on representational form.

It was thought that partisan bias would result from partisan gerrymandering during redistricting. While party control of redistricting does have the hypothesized effect in eight of the nine even-numbered election years, only in 1970, 1976, and 1982 did gerrymandering effects reach statistical significance. The results for partisan bias support recent studies that suggest that gerrymandering at the state level is not pervasive but does occasionally occur.
CHAPTER ONE: INTRODUCTION

Over the past several years, legislative elections have become the focus of a great deal of scholarly research. Students of Congress and of state legislatures have produced a voluminous literature on legislative elections. This study is another contribution to the growing body of research concerning state legislative elections.

Specifically, this study is concerned with the relationship between partisan votes and partisan seat allocation in U.S. state legislative elections. Following the pathbreaking work by King and Browning (1987), I measure the form of representation and the level of partisan bias found in elections in the states. Finally, I test hypotheses pertaining to factors explaining the levels of partisan bias and representational form found in these elections.

A few efforts have been made to identify partisan bias and representational form in the U.S. states. However, my study expands previous work by including more states (46) over a more inclusive time period (1968-87). Also of importance is the fact that I use individual elections in each state as the units of analysis and employ a pooled cross-sectional time series analysis to test my models.
Components of Representation

In much of the previous work on representation, the emphasis has been placed on the activities of elected representatives. Representation, in essence, is what representatives (usually defined as legislators) do. In Pitkin's words, representation is "acting in the interest of the represented, in a manner responsive to them" (1967, 206). This behavioral definition of representation is believed to have a number of components.

Policy responsiveness refers to the extent to which a legislator's committee activities, roll-call behavior, and oversight activities conform to the policy views of his or her constituents (Eulau and Karps 1978, 63; Fiorina 1974, 1; Jewell 1982, 18). The legislator serves as the conduit through which constituency demands are transformed into public policy. The question of policy congruence between legislator and constituents has been the subject of a number of scholarly endeavors (See, for example, Clausen 1973; Erikson 1978; Glazer and Robbins 1985; Herring 1990; Jackson and King 1989; Kingdon 1977; Kuklinski 1977; McCrone and Stone 1986; Miller and Stokes 1963; Sullivan and Uslaner 1978; Wright 1989; Wright and Berkman 1986).

Allocation responsiveness pertains to the efforts of the representative to provide public goods and services to his or her constituents as a group or as individuals (Eulau
and Karps 1978, 65-66; Jewell 1982, 19-20). To use the vernacular, this component of representation concerns the extent to which a legislator is able to "bring the bacon" (i.e., public projects) back to the district. As noted by Eulau and Karps (1978, 65), this component of representation was traditionally viewed as a "public good;" however, "with the expansion of the government's role in all sectors of society, the distinction between public and private benefits is difficult to maintain." Furthermore, some individuals within the district may "make more use of the benefits" than others (1978, 65). The legislator attempts to anticipate constituents' needs and may even stimulate their wants. The point is that, as with policy responsiveness, the emphasis is on the behavior of the individual representative.

Service responsiveness concerns the legislator's ability to provide specialized benefits to an individual or group of individuals within the district (Eulau and Karps 1978, 64; Fenno 1978, 101-135; Jewell 1982, 20). This could involve assistance in dealing with a government agency, pressuring bureaucrats to skirt rules, providing government jobs, or intervening with landlords or utility companies on behalf of a constituent. The idea is that representatives can use their positions to solve conflicts that have little to do with policy considerations.
Finally, there is a type of responsiveness that involves communication between legislator and constituency (Fenno 1978; Jewell 1982, 20-21). Some have dubbed this component of representation "symbolic responsiveness" and have defined it as a psychological attachment of constituents to legislator (Eulau and Karps 1978, 66-67). Others have emphasized the belief that representatives can heighten their support by visiting their districts and "presenting" themselves to the voters, allocating staff to the district to keep in touch with constituents, and by taking the time to explain their work and their policy stances to the "folks back home" (Fenno 1978, 31-99, 136-46, 242).

Importance of the Electoral System

In addition to the behavior of legislators, it is possible that the electoral system has an affect on representation. For example, before representatives are free to take actions that may (or, for that matter, may not) provide benefits to their respective districts, elections determine who will and who will not be present in the legislature in the first place. Candidates in the United States and other democracies compete in elections to see who will be in a position to "represent." Only candidates who pass the hurdles placed before them in the electoral system win the opportunity to practice representation.
In the United States and in other democratic political systems, parties serve as the vehicles through which candidates compete for legislative seats. Though the generalization may be less applicable to legislative elections in the U.S. than to those in Western European nations, candidates are judged to a greater or lesser degree by their party affiliation and by their consequent attachment to their party's platform. In turn, the voters' desires are implemented by the winning legislative party or parties through the legislative machinery.

The fact that members of the winning party usually have the ability to pass their policies and provide benefits to their supporters highlights the importance of the method in which seats are translated into votes in legislative elections. Far from being a trivial matter destined for status as an endnote in the annals of representation, the relationship between seats and votes in legislative elections could have a direct bearing on politics and policy in any democratic polity. Thus, the electoral system is itself an important subject of study to political scientists and to other scholars who may be concerned with representation. The literature on the swing ratio (e.g., Browning and King 1987; Campagna 1991; Campagna and Grofman 1990a; Campagna and Grofman 1990b; King and Browning 1987; Lijphart 1990; Niemi and Fett 1986; Ragsdale 1983; Taagepera and Shugart 1989) is testimony to the importance
that researchers place on electoral structure as an element in representation.

Seats, Votes, and Democratic Theory

In addition to empirical theorists, normative political theorists have also acknowledged that the seats-votes relationship is at the very heart of the issue of representation in a democratic polity. In some quarters it is thought that proportional representation is the representational form that is "fairest" or that best represents the entire polity. In proportional representation systems, the percentage of seats allocated to a party equals the percentage of the votes won by that party (i.e., a one percent increase in votes results in a one percent increase in seats). Others, however, suggest that a majoritarian form of representation is best. Majoritarian forms of representation expand the leading party’s share of legislative seats beyond the percentage of the vote won (at least when the vote is close to the 50% range) (See Taagepera and Shugart 1989). The inflation of seats to votes under majoritarianism is believed to provide stability in the legislature (and government) by producing a stronger legislative majority (and ruling coalition). This seat inflation in a majoritarian system also provides the winners with a sense that they have a mandate to implement the party’s agenda, even if the mandate is built on a seat advantage that is artificially high when compared to their votes.
Although majoritarian systems do inflate the allocation of seats in favor of the dominant party, it is arguable that such systems should not be deemed unrepresentative. As long as each party can win the same percentage of seats by winning a certain percentage of the vote, a majoritarian election system may be viewed as unbiased, and hence representative.

Dahl (1956, 63-89) is concerned with the democratic dilemma of encouraging minority representation within a framework of majority rule. Dahl does not proscribe a particular system of representation; in fact, he appears to be somewhat ambivalent on the issue. On one hand, one could argue that he seems to favor a majoritarian pattern of representation. He insists that a democracy must guarantee that candidates or policies with the most votes should displace alternatives with fewer votes. In a multiparty democracy with a proportional representation electoral system, it is possible that the party that wins the most votes and engages in formation of the government failed to win a majority of the votes. Depending on the governing coalition negotiated by party leaders, it is conceivable that some policies that are favored by a majority of the voters will not be enacted. While policies that are favored by a majority of voters may not be enacted in two-party systems either, this is more a result of weak partisanship among voters and officeholders than the result
of institutional arrangements. For example, in two-party systems (which usually have a majoritarian electoral system) parties may not have a policy agenda that is ideologically consistent, voters may not consistently link policy alternatives with the respective parties, or voters may engage in split-ticket voting (thus minimizing the possibility for effective policymaking by the government). However, these "flaws" in the policymaking ability of the government in two-party democratic systems do not result from electoral laws.

On the other hand, however, one could argue that Dahl appreciates the inclusivity that is present in proportional representation systems. Dahl believes that the ability of an individual or group to have their preferences included in the policy agenda is critical in a democracy. While one might have difficulty determining whether a majoritarian or proportional system of representation better facilitates policy discussion before an election, it appears that more diverse groups will be better represented in policy discussions after elections in multiparty, proportional representation systems. Legislators and party leaders must keep each party in the government satisfied for the governing coalition to survive. Ultimately, Dahl concludes that minority interests will be represented adequately by either arrangement in a socially complex society because of overlapping patterns of individual interests. His assumption
seems to be shared by Pitken (1967), who argues that representation is guaranteed so long as elections are frequent and fair.

While it is not inconceivable that proportional representation could result from plurality systems with single-member districts (such as is found in some elections in the U. S. states), it seems more likely that the seats-votes ratio will differ from the proportional representation value in these particular election systems. The fact that the great majority of U.S. state legislative elections are conducted in single-member districts with a "plurality winner" rule means that losing candidates can poll a relatively high percentage of the vote but not win the seat. Thus, while losing parties can win as much as 49% of the total vote, they can conceivably win no seats.

Finally, there is the issue of the dynamic relationship between seats and votes under different forms of representation. In election systems where there is a proportional relationship between seats and votes, many scholars would argue that vote changes are adequately translated into legislative seats. In single-member district, plurality election rule systems, however, a proportional relationship between seats and votes in the aggregate might suggest that the allocation of seats is not as responsive to changes in the partisan choice of voters as some might wish. Assuming that an inflated majority is
desired to facilitate the winning party's ability to govern, one might argue that a system in which seat changes are more responsive to vote changes is preferred. In addition, if a relatively large shift in the aggregate partisan vote does not result in a relatively large seat change in a single-member district plurality winner systems, it may be the case that one party has benefitted from partisan gerrymandering or that incumbents from both parties have benefitted from redistricting arrangements.

THE CONCEPTS OF PARTISAN BIAS AND REPRESENTATIONAL FORM

In an election system with proportional representation rules, obviously, the percentage of votes won by a party will equal the percentage of legislative seats allocated to that party. There are two characteristics of the seats-votes relationship that can cause the partisan percentage of seats to deviate from the partisan percentage of the votes. This deviation could result from the representational form found in the election system or from partisan bias that may exist in the election system.

Representational Form

Gary King and Robert X. Browning (1987) suggest that there is a distinction between two important aspects of the relationship between partisan votes and partisan seat allocations in legislative elections. Partisan representational form pertains to the change in seats associated with
the change in the partisan percentage of the vote. Representational form can be proportional, winner-take-all, or variations on a majoritarian form.

Proportional representation refers to an election system in which the percentage of the votes won by a particular party yields the exact same percentage of seats for the party. Alternatively, a winner-take-all system is characterized by the situation in which the party that wins 50% plus one vote wins all the legislative seats. Somewhere in between the proportional system and the winner-take-all system is the majoritarian election system. In such a system, there is an exaggeration of seats won by the winning party, although the discrepancy between percentage of seats and votes won by the winning party is not as great as in the winner-take-all system. A party in a majoritarian system usually wins few seats until it approaches 50% of the vote; each incremental percent of the vote won close to the 50% mark results in a seat gain of greater than one percent. As the party’s percentage of the vote continues to increase above the 50% mark, at some point seat gains will again be smaller than one percent for each incremental percent of votes won.

Partisan Bias

King and Browning define partisan bias as "asymmetry in the seats-votes relationship, resulting in an unfair partisan differential in the ability to win legislative
seats: the advantaged party will be able to receive a larger number of seats for a fixed number of votes than will the disadvantaged party (1987, 1251-52)." They believe that partisan bias is absent in a system in which "x% of the Democratic votes produces an allocation of y% of the seats to the Democrats, then in another election under the same system x% of the Republican votes would yield the same y% Republican allocation of seats (1987, 1252). In other words, a system in which the Democrats won 55% of the votes and 60% of the seats would not necessarily be a biased system. Only in the case in which Republicans won 55% of the votes and won more or less than 60% of the seats would there be a partisan bias according to the standard proposed by King and Browning.

According to King and Browning, then, the measure of bias is independent of the estimation of representational form. The techniques I use to measure form and bias and to test to see whether the losing party would win more or fewer seats than the winning party at a certain percentage of the vote are explained in detail in a later chapter of this work. In addition, the empirical distinctions between form and bias are graphically displayed in Chapter Three of this dissertation.

THE PURPOSE OF THE DISSERTATION

This dissertation has a twofold purpose. First, I estimate bias and representational form for 46 U. S. state
legislatures from 1968 to 1986. Every lower house election for these states in each year will be studied.

After the levels of partisan bias and representational form have been measured for each election in the time series, the second purpose of the research is to explain variation in bias and representational form over time and across states. This portion of the project involves the use of pooled data in an attempt to explain the causes of changes in bias and form from state to state and from one time period to the next.

There are a number of reasons why such a study is warranted. First, there has not been an attempt to measure partisan bias and representational form for individual elections in the U. S. states for a twenty-year period of time. In past attempts to measure bias and representational form, researchers have aggregated elections to generalize about an election system for an extended period without noting the peculiarities of individual elections (King and Browning 1987; Niemi and Jackman 1991). In those studies where individual elections are analyzed, only a small number of states are used (Browning and King 1987; Campagna 1991; King 1989).

Second, there have been relatively few attempts to explain variation in representational form and partisan bias in the U. S. states. King and Browning (1987) have tested very parsimonious theories about representational
form and bias in congressional elections and Taagepera and Shugart (1989) and Rae (1967) have studied representational form and partisan bias in national elections in a number of nations. Campagna (1991) has measured bias as a result of partisan redistricting but, as noted above, only for a small number (15) of states. Niemi and Jackman (1991) have examined changes in the swing ratio. Niemi and Jackman have also analyzed changes in partisan bias as a result of partisan redistricting for almost all the states over decades but not in individual election years. As yet, however, in no single study has a researcher utilized the King and Browning measure of representational form and partisan bias and sought to test variation in both of these components for individual elections in each of the U. S. states. Furthermore, previous models used to explain variation in representational form have been simplistic. I examine variation in representational form using a more comprehensively specified model.

THE EMPHASIS ON THE U. S. STATES

Why should one be interested in such a study at the U. S. subnational level? The fact is that since district-level data for U. S. state legislative elections over a twenty-year time period have become available in computer-readable format, state legislative elections have become an area of increasing scholarly attention. Certainly data availability tends to spark interest in an area of
research. However, aside from the fact that available data often results in scholarly inquiry, there are at least two other more important reasons why state legislative elections might become topics of interest to political scientists and other scholars.

First, the U. S. states provide an excellent laboratory within which comparative political and social research can be conducted. As electoral systems continue to be of interest to political scientists, the existence of the U. S. states and their 50 electoral systems (each with their own political and social idiosyncrasies) offer opportunities to test seats-votes relationships in a comparative setting. It is possible to test the generalizability of a number of hypotheses that have been found to apply to legislative elections throughout the world.

The ability to conduct such comparative research is important in extending scientific knowledge about partisan votes and partisan seat allocation in legislative elections. Few examples of comparative research on partisan bias and representational form exist (with the exceptions noted above). As new cases are examined over longer time periods and new variables are introduced to explain the seats-votes relationship, our knowledge of legislative election processes should be expanded.

Second, the present study should shed some light on the political process in the U. S. states. Only recently
have the electoral systems of the states been studied systematically. Little is known about the seats-votes relationship in the states, and almost nothing is known about why certain patterns exist. In fact, researchers have only recently studied individual elections over a lengthy period of time for 15 states. Furthermore, no attempt seems to have been made to explain representational form in U. S. state legislative elections.

Because the great bulk of the literature on the swing ratio is confined to research on the U. S. Congress, it is possible to study the seats-votes relationship at the U. S. state level in light of previous findings concerning congressional elections. In a sense, there is the opportunity to compare U. S. state-level processes with U. S. national-level processes. Implicit in this discussion is the assumption that the U. S. states, with their social, economic, cultural, and political diversity, are worthy in their own right to serve as units of analysis in social science research. Therefore, the present study is intended to provide knowledge about election systems in general and about state legislative election systems in specific.

PLAN OF THE DISSERTATION

The research findings presented in this dissertation are divided into seven chapters including the first, introductory chapter. The second chapter consists of a discussion of the literature concerning the various approaches
taken to study the seats-votes relationship in legislative elections. In Chapter Two, I also summarize the substantive findings of previous work on the seats-votes relationship.

In the third chapter, more detail is provided on the theoretical bases of partisan bias and representational form, with particular attention paid to the King and Browning conceptualizations. In addition, in the third chapter I submit theoretical explanations for why certain patterns of representational form should exist and why partisan bias may or may not exist in legislative elections. I suggest that representational form in a state will be a function of partisan competition at the district level and of such election rule variables as district size, number of seats, and the presence or absence of multimember districts. Partisan bias is believed to be the result of party control of the redistricting machinery and intent to manipulate the district boundaries for partisan gain.

In Chapter Four, I discuss the data and the methods I use to estimate bias and representational form. In addition, I also operationalize the independent variables used to test my hypotheses about why partisan bias and representational form vary from state to state and from one year to the next in any given state. In Chapter Five, I present a description of the findings concerning the magnitude and frequency of the values of representational form and
partisan bias. Chapter Six contains the results of my analysis for the representational form model and for the partisan bias model. In the final chapter, Chapter Seven, I discuss the implications of my findings and the conclusions that can be drawn from the research.

CONCLUSION

One of the important assumptions made in this dissertation is that an electoral system is as important a component of representation as is the behavior of elected representatives. The allocation of partisan seats in a legislature according to partisan votes is an important element in a democratic form of government. As such, election systems are political phenomena worthy of study. This research project fills a gap in the literature on U. S. state legislative elections by analyzing data from 441 elections in 46 states from 1968 to 1987.

Of specific interest in this study are two characteristics of seats-votes relationships that are identified by King and Browning (1987) as being conceptually and empirically distinct: representational form and partisan bias. My first goal is to measure partisan bias and representational form for each election in the time series. My second purpose is to explain variation in representational form and partisan bias over time and among states with models that incorporate variables related to partisan
competition at the district level, election rules, and partisan ability and intent to engage in gerrymandering.

This study is warranted by the relative inattention paid to election systems at the U. S. subnational level. In previous attempts to study seats and votes in the U. S. states, researchers have utilized only a few states, a relatively short time period, or have aggregated elections to generalize about an election system as a whole rather than analyzing individual elections. Additionally, there have been no attempts to explain representational form and few attempts to explain partisan bias at the state level. These oversights in the scholarly literature on legislative elections are particularly striking considering the rich possibilities for comparative research with the U. S. states as units of analysis. Finally, I argue that the states are important political entities that are worthy of study in their own right. This dissertation then is both an attempt to understand better the process of seat allocation by votes in legislative elections in general and an attempt to fill gaps in the literature on U. S. state politics. In the next chapter, I review the literature relating to the seats-votes relationship in legislative elections.
CHAPTER TWO: LITERATURE REVIEW

As stated in the first chapter, the purpose of the second chapter is to examine the literature concerning the seats-votes relationship in legislative elections. I describe the attempts to define the seats-votes relationship in terms of a "swing ratio" and the various formulations of partisan bias. Special attention is paid to the King and Browning method of measuring representational form and partisan bias. I also examine the various approaches to the use of data in this line of research and discuss the strengths and weaknesses of each method. A summary of the findings pertaining to representational form and partisan bias in U. S. national, U. S. state, and non-U. S. national elections is provided.

EARLY APPROACHES TO DEFINING THE SWING RATIO

Early attempts to measure the seats-votes relationship have stressed the importance of the swing ratio, which can be defined as the number or percentage of seats that will change party hands given a particular change (usually one percent) in the percentage of the vote won by the party under consideration. There are several approaches available for measuring the swing ratio. One involves using actual election data from two elections (Mayhew 1978). In this manner, one simply calculates the change in a party's seat shares divided by the party's change in vote shares.
from one election to the next. Using regression analysis, the swing ratio (analogous to representational form) would be determined by the slope of the regression line charted through only two points (elections).

Figure 2.1(a) illustrates the biyearly method of calculating the swing ratio. Using hypothetical data, one can assume that Republican candidates in 1990 poll 48% of the votes and only win 40% of the seats. In 1992, Republicans win 52% of the votes and 52% of the seats. Rather than calculating the regression line between the two points, one can more easily determine the swing ratio in the manner noted in the preceding paragraph. The swing ratio using these two elections would be 3.00 since the change in seats of 12% corresponds to the change in votes of 4% (i.e., $12 / 4 = 3$). If one used the 1992 and 1994 elections to calculate a swing ratio, the results would equal one since an eight percent change in votes (from 52% to 60%) produces an eight percent change in seats (from 52% to 60%).

Another approach is to use actual multiyear election data to measure system responsiveness and party bias. The difference between this technique and the biyearly form is that the multiyear approach involves charting the regression line through a number of data points (Niemi and Fett 1986, 77-78). Such an approach is undertaken by Rae (1967). Rae uses data from 1945 to 1964 from Australia, Austria, Belgium, Canada, Denmark, Finland, France, West
Figure 2.1(a)
Biennial Calculation of Swing Ratio with Hypothetical Data, 1990-94

Figure 2.1(b)
Multiyear Calculation of Swing Ratio with Hypothetical Data, 1980-98
Germany, Great Britain, Iceland, Ireland, Israel, Italy, Luxembourg, the Netherlands, New Zealand, Norway, Sweden, Switzerland, and the United States. Rae does not utilize regression in his study, but he does identify patterns of deviation between seats and votes using bivariate regression.

Tufte (1973) also uses the historical data method. He employs longitudinal data on legislative elections from Great Britain (1945-70), New Zealand (1946-69), the United States (1868-1970), and the states of Michigan (1950-68), New Jersey (1926-69), and New York (1934-66). Tufte illustrates that changes in the representation coefficient can be charted over time using groups of three successive elections (or election "triplets") and by producing a representation coefficient for each four-year period of time in U.S. congressional elections (See Tufte 1973, 550, table 6).

Figure 2.1(b) provides an example of how a multiyear swing ratio is produced. The data points in this figure represent results for Republicans in hypothetical elections from 1980 to 1998. The percentage of seats and the percentage of votes for these 10 elections are plotted on a chart. A regression line representing the best fit among the data points is created. This regression line is then used to calculate the swing ratio. In the example in Figure 2.1(b), one can quickly calculate the approximate
swing ratio value by examining the seat change given some change in vote increment. It can be observed that a change in Republican vote from 45% to 50% corresponds to an approximate increase in seats from 41% to 51%. This suggests that a 5% change in votes causes a 10% change in seats; therefore, the swing ratio for this 10-year election series is 2.00.

Some of the early work in the subject area stressed more advanced approaches to the study of the swing ratio. James P. Smith, who published as early as 1909, discovered that the relationship between seats and votes in British legislative elections could be calculated by the formula:

\[
\frac{A}{B} = \frac{C^3}{D^3},
\]

(2.1)

where \(A\) = number of seats won by winning party, \(B\) = number of seats won by losing party, \(C\) = % votes for winning party, and \(D\) = % votes for losing party. Kendall and Stuart (1950) note that this "law of cubic proportion" or "cube law" operated in Britain in 1935 and 1945 and in New Zealand in 1949. However, Kendall and Stuart point out that the heavily Democratic vote in the southern United States during the 1944 U.S. congressional election caused a lack of uniformity in the distribution in proportion of votes won by the Democrats across the country. Neither did the cube law apply to U.S. House of Representatives elections in 1888-92 or 1966-70 (Tufte 1973). A number of approaches to the study of the translation of votes into
seats have emerged as a result of these earlier research efforts.

FORMULATIONS OF REPRESENTATIONAL FORM AND PARTISAN BIAS

The early approaches to calculating the swing ratio are overly simplistic. The biyearly and historical methods assume a linear relationship between seats and votes. Likewise, the cube law specification suggests that the swing ratio will always be close to 3.00 in single-member, plurality winner districts. The notion that vote changes always produce seat changes in some linear or cubic proportion has been challenged by researchers over the last several years.

The King and Browning Formulation

King and Browning (1987) believe that there are two distinct, important characteristics of the seats-votes relationship in legislative elections: representational form and partisan bias. They suggest that one can measure the representational form (formerly known as the swing ratio) and the partisan bias in an election system using only one model. They apply to congressional elections from 1950 to 1984 a variation of a model first suggested by Tufte in 1973. The popular version of the King and Browning formulation that is commonly used by most practitioners is:
(S / [1 - S]) = b (V / [1 - V])^c  \tag{2.2}

where \( S \) is a particular party's share of the legislative seats, \( V \) is the same party's percentage of the vote won in the election, \( b \) is the parameter that measures partisan bias, and \( c \) is the parameter for representational form.

The advantage of this model is that it captures the range of possible functions that can characterize the relationship between partisan votes and partisan seats.

In their equation, King and Browning explicitly differentiate between the form of representation and partisan bias. The form of representation is represented by a coefficient ranging from 0 (no responsiveness of seat changes to vote changes) to infinity \([0, \infty)\) (with the infinity value representing a winner-take-all form of representation). A representational form parameter of 1.0 indicates a system of strict proportional representation. A coefficient between these extreme values (usually thought to be close to 3.0 by those who identified the "cube law" of British elections) exemplifies a majoritarian form of representation, where vote percentages close to 50% (but not equal to 50%) result in exaggerated seat gains for the winning party. Thus, as \( c \) increases (controlling for \( b \)), the election system takes on a more majoritarian form.

These ideal types of seats-votes curves can be visualized in Figure 2.2. The nuances of these ideal types will be discussed in more detail in Chapter Three of this work.
Figure 2.2.
Three Examples of Representational Form, No Partisan Bias

Source: Adopted from King and Browning (1987)
The parameter for bias is independent of the representational form of the election system and both parameters are calculated simultaneously. As the bias parameter varies, one can identify how the seats-votes curve shifts in favor of one party or the other. That is to say, the bias parameter measures the degree to which parties that win the same percentage of the vote at any particular representational form win identical percentages of the seats in the legislature. In the case of King and Browning’s equation, a bias parameter of 1.0 equals no bias, a parameter of less than 1.0 equates to bias toward the Democrats, and a parameter value of greater than 1.0 indicates that the system gives an "unfair" advantage to the Republicans.

The Importance of the King and Browning Formulation

King and Browning’s work signals a break with the early, elementary models of the swing ratio and with the later, more sophisticated attempts to model the seats-votes relationship. They follow up on the suggestion by Tufte (1973) and Grofman (1983) that there is not always a linear relationship between seat changes and vote changes. Likewise, they agree with Tufte that the seats-votes relationship need not follow the cube law pattern. Rather, they choose to model the seats-votes relationship to depict the
varying nature of this relationship. Thus, they are able to provide operationalizations for representational form and partisan bias for all types of legislative elections.

Second, the mere idea that partisan bias exists as a characteristic of the election system that is distinct from representational form was a break from previous research. Although Tufte (1973) and Grofman (1983) hinted that this might be the case, they did not investigate this possibility with election data to the extent that King and Browning did. In fact, this theoretical and empirical breakthrough is closely related to the fact that King and Browning do not specify any particular representational form parameter in their model. In essence, by assuming that the seats-votes relationship was linear, previous researchers had identified as bias any deviation between the percentage of the seats and the percentage of the votes won by a particular political party. King and Browning attribute some of this deviation to the fact that the representational form may not be proportional. If the system were majoritarian in nature, then some deviation between the proportion of the seats and votes garnered by a party would be expected (assuming that one were examining the relationship at other than the 50% vote point on the continuum).

Therefore, King and Browning suggest that early attempts to measure bias were not measuring bias at all
(or, at least, not exclusively). Partisan bias exists only as asymmetry in the actual representational form found in the system. Because previous research assumed some particular relationship between partisan seats and partisan votes, therefore, previous models used to measure bias and/or representational form were misspecified and did not correctly measure either characteristic of the election system. Because their model allows for the form of bias to depend on the type of representational form and therefore allows "for every possible degree of partisan bias and every possible form of democratic representation," they believe their model to be more realistic than other models of the seats-votes relationship (King and Browning 1987, 1256).

Other Formulations of the Seats-Votes Relationship

Other approaches to the study of the seats-votes relationship that are similar to that of King and Browning have emerged in the literature. As a forerunner of King and Browning, Grofman (1983) compares the mathematical properties of the measures of bias and proportionality that had appeared in the literature up until the time of his writing. He finds the swing ratio of Tufte calculated "in the neighborhood" of 50% of a party's votes to be an appropriate measure of proportionality in the seat-votes relationship.
However, Grofman believes that "bias as a gini-index-like measure of the area under seats-votes discrepancy curves is best able to deal with properties of the seats-votes relationship over the entire range of [votes]" (Grofman 1983, 308, 317). Grofman's equation (1983, 314) is based on the uniform partisan swing approach to data collection:

\[ D = \int S_1(x) - S_2(x) = \int D_s(x), \quad (2.3) \]

where \( D \) is partisan bias, \( x \) is vote share, \( S_1(x) \) is seat share of party 1 corresponding to a vote share of \( x \), \( S_2(x) \) is seat share of party 2 corresponding to the same vote share of \( x \), and \( D_s(x) \) (obviously) is the seat share of party 1 if its vote share is \( x \) minus the seat share of party 2 if its vote share is \( x \). Grofman also notes that if the seat percentage and vote percentage are linearly related, i.e., if:

\[ S = B_s V + \psi, \quad (2.4) \]

where \( S \) is a party's seats, \( B_s \) is the regression coefficient for the vote percentage when seats are regressed on vote percentage, \( V \) is a party's vote percentage and is the error term when seats are regressed on vote percentage, then Equation 2.3 becomes:

\[
\begin{align*}
D &= \int (B_s x + \psi) - (1 - B_s (1 - x) + \psi) \\
&= \int (1 - B_s - 2\psi) \\
&= \int D_s \\
&= (.5 - x) (1 - B_s - 2\psi),
\end{align*}
\]
where $D$, $B_i$, $x$, and $D_4$ are defined as in Equations 2.3 and 2.4. Grofman does "not bother to work out the implications for [partisan bias] of a nonlinear seats-votes relationship . . ." (Grofman 1983, 314). He goes on to stress that a "normalized measure of bias" ranging from $-1.0$ to $1.0$ might be optimal, although such a recalculation of his "ideal equation" does not appear to be essential.

To illustrate how this technique operates, Grofman uses data produced by Scarrow (1981). Scarrow uses the uniform partisan swing approach to calculate partisan seats and votes. However, Scarrow only estimates bias from hypothetical swings of plus and minus 5% of the vote around the 50% mark (i.e., from each parties hypothetical vote of from 45% to 55%). In addition, Scarrow does not use regression but calculates bias as the net difference at each point. Grofman takes the data from Scarrow and puts it in a graph format for purposes of illustration. Table 2.1 is a reproduction of the Scarrow data from the Connecticut Assembly elections of 1970 and 1972. These data are produced by excluding uncontested elections and calculating the two-party vote for Republicans and Democrats. As noted by Grofman, in the 1972 Connecticut Assembly there is a bias reversal: "below 53 percent of the votes $D_4$ indicates a Republican advantage, above 53 percent of the vote $D_4$ indicates a Democratic advantage (Grofman 1983, 310)."
### Table 21

**Democratic and Republican Seat Shares in the Connecticut Assembly**

At selected proportions of the statewide (two party) vote in 1970 and 1972 for hypothetical elections based on uniform swings across all districts from the observed seat-vote value in that year.

<table>
<thead>
<tr>
<th>Proportion of State-Wide Vote</th>
<th>45%</th>
<th>46%</th>
<th>47%</th>
<th>48%</th>
<th>49%</th>
<th>50%</th>
<th>51%</th>
<th>52%</th>
<th>53%</th>
<th>54%</th>
<th>55%</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1970</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dem</td>
<td>42.9</td>
<td>45.0</td>
<td>48.0</td>
<td>49.7</td>
<td>52.0</td>
<td>55.9</td>
<td>59.3</td>
<td>62.1</td>
<td>64.4</td>
<td>65.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep</td>
<td>34.5</td>
<td>35.6</td>
<td>37.9</td>
<td>40.7</td>
<td>44.1</td>
<td>48.0</td>
<td>52.0</td>
<td>54.2</td>
<td>57.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bias</td>
<td>+8.4</td>
<td>+10.2</td>
<td>+10.1</td>
<td>+9.0</td>
<td>+7.9</td>
<td>+11.8</td>
<td>+7.9</td>
<td>+9.0</td>
<td>+10.1</td>
<td>+10.2</td>
<td>+8.4</td>
<td>2.26</td>
</tr>
<tr>
<td><strong>1972</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dem</td>
<td>36.4</td>
<td>38.4</td>
<td>40.4</td>
<td>41.1</td>
<td>42.4</td>
<td>48.3</td>
<td>51.0</td>
<td>55.0</td>
<td>58.3</td>
<td>61.9</td>
<td>67.5</td>
<td></td>
</tr>
<tr>
<td>Rep</td>
<td>32.5</td>
<td>37.1</td>
<td>41.7</td>
<td>45.0</td>
<td>49.0</td>
<td>51.7</td>
<td>57.6</td>
<td>58.9</td>
<td>59.6</td>
<td>61.6</td>
<td>61.6</td>
<td></td>
</tr>
<tr>
<td>Bias</td>
<td>+3.9</td>
<td>+1.3</td>
<td>-1.3</td>
<td>-3.9</td>
<td>-6.6</td>
<td>-3.4</td>
<td>-6.6</td>
<td>-3.9</td>
<td>-1.3</td>
<td>+1.3</td>
<td>+3.9</td>
<td>3.11</td>
</tr>
</tbody>
</table>

**Source:** Scarrow (1981, Table III). Cell entries indicate seat percentages that a party would have achieved at the (column) specified vote share. Arrows indicate actual election outcomes. Boxed outcomes represent situations where a party with a vote share less (more) than .5 would achieve a projected seat share greater (less) than .5.
Figures 2.3 and 2.4 are Grofman's efforts to graph the data from Scarrow (1981). Grofman suggests that the best measure of bias is the area between the respective party curves: "Moreover, if we use a positive sign for the area where the curve for party 1 is above that for party 2, we have a natural way of capturing in a single number the net bias over a range of election outcomes (1983, 310)."

There are two differences between the methods of King and Browning (1987) and the suggestions made by Grofman concerning the Scarrow data. First, the former emphasize the need to allow the representational form coefficient to be unspecified by the researcher. Second, King and Browning prefer to measure bias as deviation from a "no bias" curve given the particular estimate of representational form found in the election. In this particular circumstance, Grofman seems to assume that the system should be proportional and then measures bias as the deviation between points on the curve for each party. Nonetheless, as mentioned earlier, Grofman does recognize that an election system does not necessarily have to be proportional; he simply does not test this assumption with data.

Taagepera and Shugart (1989) introduce a twist to the King and Browning model. Their equation, which they argue is applicable to plurality elections is:

\[ \left( \frac{S_k}{S_{l,3}} \right) = \left( \frac{V_k}{V_L} \right)^n, \]

where \( n = \log V / \log E \), where \( S_k \) is the seats for the
Figure 2.3. Hypothetical Seats-Votes Curves for the Two Major Parties, Connecticut Assembly, 1970

Source: Scarrow (1981)
Figure 2.4. Hypothetical Seats-Votes Curves for the Two Major Parties, Connecticut Assembly, 1972

Source: Scarrow (1981)
winning party, $S_t$ is the seats for the losing party, $V_k$ is the votes for the winning party, $V_k$ is the votes for the losing party, $V$ is the total number of voters, and $E$ is the total number of electoral districts. The authors are not really interested in producing a parameter measuring partisan bias. As shown in Figure 2.5, however, they do plot curves on a graph with the $x$-axis as percent vote shares and the $y$-axis as the advantage ratio (% seats / % votes) to illustrate how different electoral systems deviate from strict proportionality in the seats-votes relationship. Taagepera and Shugart are more concerned with measuring the form of representation and identifying independent variables that explain the representational forms (1989, 166-93). Their equation could perhaps be transformed to include a bias parameter. However, because the present research program specifies party-related causes of partisan bias, the work by Taagepera and Shugart is important primarily for its contribution to explaining representational form.

In addition, a number of other researchers have recently applied the King and Browning approach with slight modifications to a variety of electoral contexts. Niemi and Jackman (1991) apply both the biyearly swing ratio model and the King and Browning approach to ICPSR election data in their study of state legislative elections in 45 states in the 1970s and 1980s. Campagna (1991), Campagna
Figure 2.5. Predicted Proportionality Profiles at a Number of District Magnitudes

Source: Taagepera and Shugart (1989, 192)
and Grofman (1990a), and Browning and King (1987) also adopt King and Browning's method in their studies of U. S. state legislative election systems. Garand and Parent (1991) use the same approach in their work on the U. S. electoral college as do Gelman and King (1990) in their work on Congress. In addition, King (1990) borrows the same technique in his study of multiparty democracies. Ansolabehere and King (1991) also apply the King and Browning method to presidential primaries and caucuses in 1976-88.

DIFFERENT METHODS OF USING DATA

In addition to the variety of ways in which seats-votes relationships can be defined, there is a dispute in this area of research as to how to use election data to best represent the relationship. The two approaches to employing data for studying the seats-votes relationship in legislative elections are to use actual election results or to use hypothetical data that are generated from an actual election result. Both of these methods have been used by scholars of voting behaviour. Each approach has particular advantages and disadvantages.

Use of Actual Election Results

As noted previously, one approach to using data to study the relationship between partisan seats and votes is to employ actual election data from two elections. Another
approach is to use actual election data from multiple elections to measure system responsiveness and party bias. The point is that in both cases, data on seats and votes from actual elections become points through which a regression line is drawn.

Both Rae (1967) and Tufte (1973) utilize historical election data. Other researchers have used the historical approach to measure partisan bias and responsiveness in electoral systems. Niemi and Jackman (1991), Gryski, Reed, and Elliott (1990), and Browning and King (1987) apply the historical method to U.S. state legislative election systems. Taagepera and Shugart (1989, 156-98) and King (1990) use the historical method to chart seats-votes curves for national lower house elections in the United Kingdom, New Zealand, Canada, the United States, Finland, Japan, Austria, Switzerland, Italy, and the Netherlands. While most of their findings are calculated using another approach, Garand and Parent (1991) also report some results for the U. S. electoral college that are based on historical data.

Use of the Uniform Partisan Swing Method

Alternatively, Butler (1951) suggests that partisan bias can be discovered by using data from one election. Taking actual election returns from Great Britain, Butler makes the case that one could create hypothetical data by increasing the district vote for the other major party by certain increments (preferably one percent). The changes
in seats provided by the hypothetical incremental changes in votes should tell the researcher much about which party benefits from the electoral arrangement. Butler ultimately concludes that partisan bias can be identified by examining the partisan seat distributions when the respective parties are provided with 50% of the hypothetical two-party vote. The uniform partisan swing method was eventually adopted by Campagna and Grofman (1990b) and Gelman and King (1990) to measure bias and responsiveness for U.S. congressional redistricting, by Scarrow (1981, 1982, 1983) to measure bias in state legislative elections in New York and Connecticut, by King (1989) to estimate responsiveness and partisan bias in six U. S. state House of Representatives elections after redistrictings, by Campagna and Grofman (1990a) and Campagna (1991) to measure responsiveness and party bias in 15 state upper and lower houses, and by Backstrom, Robins, and Eller (1978) to identify partisan bias in the Minnesota state Senate election of 1972. In addition, Garand and Parent (1991) apply the uniform partisan swing method to measure partisan bias and responsiveness in the U. S. electoral college system.

Advantages of Using Actual Election Results

A number of researchers have argued the merits of the three methods of data application. Either of the techniques using actual election results has the advantage of data availability. Even state legislative election data
are now relatively easy to utilize. Basically, the use of actual data means that one does not have to go through the step of manipulating the data to see how many seats are won by a party given incremental changes in the partisan vote percentages.

Aside from being easier to employ, the two approaches in which election results are utilized are satisfying in the sense that one is not asking "what might have been" but is instead dealing with what actually transpired in any given election. Election results from the uniform partisan swing method are simulated. One is measuring what would have happened if voters would have changed their preferences at the same rate across all election districts. Some researchers might be philosophically opposed to a technique that makes the latter assumption; others may be in opposition to any method other than one that makes use of only actual election results.

Disadvantages of Using Actual Election Results

A biennial measure of the swing ratio is susceptible to wide fluctuation. Odd swing ratios would result, for example, in a case in which a party won 50% of the votes and 49% of the seats in one election and 49% of the votes and 50% of the seats in the following election [swing ratio = (49 - 50) / (50 - 49) = -1.00!]. Even the use of only 3 or 4 elections, a practice adopted by Tufte, causes very unstable estimates. A small sample of cases means that one
exceptional election outcome (i.e., an outlier) can unduly affect the calculation of the swing ratio. Of course, the biyearly swing-ratio measure and Tufte's election triplets can be useful for identifying anomalous elections, but for providing generalizations about an election system as a whole a longitudinal approach should be employed. Niemi and Fett (1986), however, note that the multiyear form of the historical approach, if it involves a large enough number of elections (certainly more than Tufte's three), solves this problem of the fluctuating swing ratios.

The multiyear approach also has its limitations, however. Findings can be affected by the length of the time period used. Scholars must walk a fine line between choosing a time period that is so long that important shifts in the swing ratios are masked or so short that generalizations about the partisan bias and representational form of the system cannot be made. For election data collected over long periods of time, divisions in the time series are encouraged by Niemi and Fett. Divisions that are extremely short may make it difficult to determine what the swing ratio is at the "current" time until newer data become available. The researcher must be sensitive to these problems of temporality and must be guided by theory and previous research in making politically-relevant divisions of the data.
A second disadvantage of the historical approach (both biyearly and multiyear) is that this formulation of the seats-votes relationship is especially sensitive to whether uncontested elections are included or excluded from the data set. The variation in uncontested elections over time means that partisan percentage of the vote will sometimes be inflated, thus affecting the calculation of the swing ratio for the time period. Suggestions on how to alleviate this problem will be discussed later in the work.

Third, swing ratio or responsiveness parameter values may differ depending on which seats and votes data are actually used. This problem is only faced by scholars of the U.S. Congress, however. For reasons that are not entirely clear, the two compilations of data most commonly employed -- one set accumulated by Stokes and Iverson (1962) from Historical Abstracts and U.S. Statistical Abstracts and the other compiled by Clubb and Austin (1984) from Congressional Quarterly's Guide to U.S. Elections -- have slight discrepancies. The discrepancies are most acute before 1930 (Niemi and Fett 1986, 76-79, 84-87). However, as previously mentioned, this is not a problem for those who want to study state legislative elections.

Advantages of the Uniform Partisan Swing Approach

The "single-year" or uniform partisan swing method also has its advantages and disadvantages. On the positive side, this method is not dependent on past election
results. This makes it particularly useful for judging the fairness of a redistricting plan after only one election (Niemi and Fett 1986, 82). It is also useful in identifying an anomalous election without grouping two or three elections together. A related advantage is that trends in bias and representational form can be charted cross-sectionally for each election and longitudinally for the series as a whole (Garand and Parent 1991, 7).

A second advantage to the uniform partisan swing approach is that the swing ratio or representational form coefficient is less dependent on how votes are counted (i.e., whether uncontested elections are included in the data set) than is the case with the historical approach. Unlike the historical method, the uniform partisan swing approach utilizes hypothetical changes in votes from a single election. The results from using the latter method are thus not dependent on how data is coded in the previous election(s). Rather, the uniform partisan swing approach involves the coding of hypothetical data from the actual results from one election. One would have to chart seat changes given a 50% reduction in a party’s vote in order for the winner of an uncontested seat to “lose” that seat. Thus, it is only at the extreme margins of plotting vote increments that seat changes will occur (Niemi and Fett 1986, 87).²
However, measures of partisan bias are sensitive to the inclusion or exclusion of contested elections regardless of which method of data collection is chosen (Tufte 1973, 542-43). For example, under the uniform partisan swing method, a Republican who ran uncontested would be listed at 100%, 99%, 98%, etc., for 1% incremental decreases in Republican vote. The resulting percentage of Republican vote at the state level would be different depending on whether the researcher included uncontested elections.

Third, if one wanted to do so, one could use the uniform partisan swing approach to estimate representational form and partisan bias for vote proportions that are larger or smaller than historical vote proportions. For instance, plotting extreme vote proportions would allow one to test whether or not both parties in any given state could win all the seats in the state legislature with the same percentage of the vote (Garand and Parent 1991, 7). The historical method, of course, is limited by actual election outcomes.

Disadvantages of the Uniform Partisan Swing Approach

There are three weaknesses in the uniform partisan swing approach. One weakness results from the manner in which the technique has been applied and the other two are inherent weaknesses. Niemi and Fett (1986, 80) criticize Butler for only using 11 points (plus and minus 5% of the two-party vote won by a particular party and the actual
two-party percent of the result won by that party) rather than a larger number of points. Of course, as noted in the preceding paragraph, the vote percentage points used by Butler are not etched in stone. It is conceivable that hypothetical data could be charted for a party from 0% of the vote to 100% of the vote in the districts. In fact, one could produce estimates of partisan bias and representation for a number of different data points and compare results to discover the implications of charting a certain number of points.

Second, the uniform partisan swing method obviously contains the assumption that vote changes occur uniformly across election districts. This assumption is problematic for a number of reasons. If a candidate wins by an extremely large margin of the vote, then the plotting of hypothetical increments across all districts could cause a candidate to receive over 100% or less than 0% of the vote.

In addition, the assumption of uniformity of vote swings is not necessarily valid empirically. The appeal of individual candidates and the possibility that issues that are salient to the campaign are district-level issues rather than state or national issues makes it implausible for one to assume that partisan percentage of the vote would change uniformly across districts. For example, a party with an incumbent of lengthy tenure in one district would, ceteris paribus, receive a higher percent of the
vote than would a candidate who carries the party label but who is running for an open seat. Another example would be the case of an incumbent who is penalized by the electorate due to a scandal while other partisans are judged on the basis of party label, state issues, constituency service, or their unscandalous record. Furthermore, the assumption of uniform vote swings denies researchers the opportunity to differentiate between electoral forces that occur at the national or state level from those that are unique to the election district (King 1989).

Niemi and Fett, who minimize the problem of uniformity, state that the hypothetical approach is simply meant to be "a general measure of the relationship between votes and seats won" rather than an explanation of specific election outcomes (1986, 82). King (1989), however, incorporates a complex measure of mean voter preference distribution. King's parameters include a measure of the direction and degree of skewness and the peakedness of the preference distribution. King's use of this technique is an effort to produce district differences in hypothetical vote swings based on past district differences in vote swings.

The third apparent disadvantage to the uniform partisan swing approach is that, in fact, the data are not actual election results. As with the second disadvantage of this method, however, it should be remembered that the
hypothetical method is a tool. As suggested by Niemi and Fett (1986, 82), "the hypothetical swing ratio [as applied to U. S. congressional elections] measures what the effect on the number of seats would be either of electoral forces not directly controllable by the party (e.g., the state of the national economy) or of forces that are rather broadly and uniformly felt (e.g., nomination of an especially popular or unpopular presidential candidate)." It should be noted that King (1989) also argues that the uniform partisan swing approach to applying data is superior to the historical data gathering technique. Furthermore, one should be reminded that the uniform partisan swing method does use the values from actual election results as the basis on which the hypothetical data are plotted.

SUBSTANTIVE FINDINGS ON SEATS AND VOTES

The literature on the seats-votes relationship generally falls into three categories of election studies: U. S. national elections, non-U. S. national elections, and U. S. state elections. In reporting the findings from these three types of elections, one can also differentiate between the findings concerning each of the two characteristics of the seats-votes relationship, representational form and partisan bias. In this section of the chapter, the findings concerning representational and partisan bias in the range of electoral contexts are reported.
U. S. National Elections: Representational Form

In this section, the findings pertaining to U. S. national elections are discussed. Several kinds of election contests -- congressional elections, presidential elections, and presidential nomination contests -- fall under the rubric of U. S. national elections. Table 2.2 summarizes the results of studies pertaining to representational form in these elections.

One of the early works on Congress was undertaken by Dahl (1956). Dahl examines the swing ratio for both Houses of Congress in elections between 1928 and 1954 (1952 for the Senate). In a foreshadowing of things to come, Dahl (1956, 148-49) regressed Democratic percent of the two-party seats on Democratic percent of the two-party vote (with an error term included), and finds that the coefficient for the independent variable is 2.5 in the House \( R^2 = .916 \) and 3.02 in the Senate \( R^2 = .951 \).

Tufte (1973) illustrates that the responsiveness coefficient for elections to the U.S. House of Representatives was 2.39 for 1868 to 1970. For 1948 to 1970, however, the responsiveness coefficient declined to 1.93. Using triplets of elections, Tufte shows that the responsiveness coefficient was declining in U.S. congressional elections over time (6.01 in 1870-74 and 0.71 in 1966-70).
Table 2.2. Summary of Results for Representational Form, U. S. National Elections

<table>
<thead>
<tr>
<th>Authors</th>
<th>Political System</th>
<th>Range of Scores</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dahl (1956)</td>
<td>Congress (1928-54)</td>
<td>2.50</td>
<td>Assumes a linear seats-votes rel.</td>
</tr>
<tr>
<td></td>
<td>Senate (1928-52)</td>
<td>3.02</td>
<td>Assumes a linear seats-votes rel.</td>
</tr>
<tr>
<td></td>
<td>Congress (1948-1970)</td>
<td>1.93</td>
<td>Assumes a linear seats-votes rel.</td>
</tr>
<tr>
<td></td>
<td>Congress (1870-74)</td>
<td>6.01</td>
<td>Uses election triplets</td>
</tr>
<tr>
<td></td>
<td>Congress (1966-70)</td>
<td>0.71</td>
<td>Uses election triplets</td>
</tr>
<tr>
<td>King and Browning (1987)</td>
<td>Congress (1950-84)</td>
<td>0.93-3.02</td>
<td>Most states are between 1.0-3.50</td>
</tr>
<tr>
<td>King (1990)</td>
<td>Congress (1946-86)</td>
<td>1.78</td>
<td></td>
</tr>
<tr>
<td>Taagepera and Shugart (1989)</td>
<td>Congress (1950-70)</td>
<td>2.93</td>
<td></td>
</tr>
<tr>
<td>Campagna and Grofman (1990b)</td>
<td>Congress (1980)</td>
<td>1.11-2.18</td>
<td>All states in agg. produce 1.62</td>
</tr>
<tr>
<td></td>
<td>Congress (1982)</td>
<td>1.68-1.85</td>
<td>All states in agg. produce 1.77</td>
</tr>
<tr>
<td>King and Gelman (1991)</td>
<td>Congress (1946-86)</td>
<td>1.30-2.50</td>
<td></td>
</tr>
<tr>
<td>Geer (1986)</td>
<td>Pres. Prim. (1972-84)</td>
<td>1.05-3.71</td>
<td>Most values are between 1.23-2.01</td>
</tr>
<tr>
<td>Ansolabahere and King (1990)</td>
<td>Pres. Prim. and Cauc. (1976-88)</td>
<td>0.96-6.56</td>
<td>Most values are between 2.16-3.10</td>
</tr>
<tr>
<td>Garand and Parent (1991)</td>
<td>Electoral College (1872-1988)</td>
<td>1.45-8.47</td>
<td>Most values are between 4.00-6.00</td>
</tr>
</tbody>
</table>
King and Browning (1987) measure representational form for each state for the U. S. congressional elections between 1950 and 1984. They find that the representation coefficient ranged from 0.93 (in California) to infinity (in five states), with 26 states having values ranging between 1.00 and 3.50. For purposes of comparison, Figure 2.6 illustrates the frequency of representational form coefficients in the states in the King and Browning study. The authors also present a short section of research in which they provide empirical evidence that Taagepera's index (which measures "the number of districts relative to the number of voters") and party competition (measured by a standardized version of the Ranney index) are strongly, positively correlated with the representation coefficients. King (1990) estimates the representational form parameter in the aggregate for U. S. House elections (1946-86) to be 1.78.

Taagepera and Shugart (1989) measure the representational form of elections to the U. S. House of Representatives from 1950 to 1970. They examine the coefficients for the time series as a whole. They find that the congressional election system had a representational parameter of 2.93, closely following what would have been expected under the cube law.

Campagna and Grofman (1990b) measure bias and representational form parameters for U. S. congressional
Figure 2.6. Frequency of Representational Form Coefficients for Each State in Congressional Elections, 1950-84.

Source: King and Browning (1987)
elections in 1980 and 1982 and for states categorized by party control of the redistricting machinery in the same years. They discover that the swing ratio is 1.62 in 1980 and 1.77 in 1982 for states in the aggregate. In both these years, elections in states in which one party controls all three state institutions (both houses of the state legislature and the governorship) that are concerned with redistricting had larger swing ratios than did states with divided control of government (1990, 1249). When they delete states in which redistricting was performed by the courts or by a commission, the pattern remains the same for 1980 but changes slightly in 1982 (1990, 1252). In the latter election, the form parameter rises to 1.93 and states with two institutions controlled by Republicans produce a higher form coefficient (1.82) than do states with complete Democratic control (1.79).

King and Gelman (1991) estimate representational form for individual U. S. congressional elections from 1946 to 1986. They find that every election except 1986 falls between the 1.50 and 2.50 values for representational form. In addition, they discern a clear trend in which representational form declines over time. In fact, the form values decline from approximately 2.30 in the immediate post-War years to 1.30 in 1986 (King and Gelman 1991, 126-27).

The consensus for congressional elections is that representational form seems to be somewhat majoritarian.
As the coefficients in the previous studies suggest, however, U. S. congressional elections are less majoritarian than what would be expected if the cube law were applicable. There also seems to be a trend toward decreasing responsiveness of seat changes to vote changes in the competitive range as time progresses.

Geer (1986) adopts a "delegates/votes" ratio for primary elections for the Democrats in 1972-84 and for Republicans in 1976 and 1980. He finds that the primary systems are very close to proportionality, ranging from 1.23 (Democrats in 1976 and 1980) to 2.01 (Republicans in 1976). An examination of the delegates/votes ratios for individual candidates also shows that those who win the nominations also have ratios that tend to be proportional. Two exceptions to the latter trend are the more "majoritarian" victories of McGovern in 1972 (responsiveness coefficient of 2.30) and Ford in 1976 (2.14).

Ansolabehere and King (1990) also study presidential nomination contests but they employ the King and Browning technique to measure representational form and bias, they use data from 1976 to 1988, and they control for election rules. They find that Republican contests are more responsive to vote changes than are Democratic contests. Also, not surprisingly, primaries without rules that demand proportionality between seats won and delegates won (i.e., having district plurality rules) have a higher
representational form than do proportional rule primaries and caucuses. Ansolabehere and King find that the form coefficients range from 0.96 in Democratic caucuses in 1976 to 6.56 in Republican district plurality primaries in 1976. While their results are similar to those of Geer, they find that when they disaggregate partisan contests by type of election rule district plurality primaries for both parties are quite majoritarian (with most coefficients ranging from 2.16 to 3.10).

Garand and Parent (1991) study the representational form of the electoral college. In this work, the electoral college is found to be highly responsive to votes, with the representation coefficient of 5.38 indicating a system somewhere between majoritarian and winner-take-all. The representation parameter for individual presidential elections ranged from 1.45 in 1924 to 8.47 in the hotly contested election of 1960.

The results indicate that there is a variety of representational form patterns for U. S. national elections. Presidential elections are highly majoritarian, most likely because such contests involve winner-take-all rules in relatively large electoral units (the U. S. states). Presidential primaries with winner-take-all rules also have relatively large representational form values. Congressional elections, which of course have districts that are smaller than the electoral units for presidential
elections, have slightly majoritarian patterns. Presidential primaries and caucuses with proportional (or nearly proportional) winner rules exhibit representational form coefficients that are very nearly proportional.

U. S. National Elections: Partisan Bias

As is the case with representational form, it is possible to measure partisan bias in national elections in the United States. Most of the authors cited in the preceding section also report findings for partisan bias. Thus, the findings pertaining to bias in congressional and presidential elections are discussed in this section. A summary of the results of these findings is provided in Table 2.3.

Tufte (1973) measures partisan bias in elections to the U.S. House of Representatives from 1866 to 1970. He defines bias as the proportion of vote required to give a particular party of the researcher's choosing a majority of legislative seats. He finds that there was a slight bias in favor of the Democrats in that only 49.1% of the vote was needed to gain a majority of the seats (i.e., partisan bias toward the Democrats of 0.9%). From 1948 to 1970, the Democratic bias increased to 1.2%. Using triplets of elections, he finds that the median absolute partisan advantage was 1.4%, and that the Democrats were benefitted by bias in 10 of the 17 election triplets.
<table>
<thead>
<tr>
<th>Authors</th>
<th>Political System</th>
<th>Range of Scores</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tufte (1973)</td>
<td>Congress (1868-1970)</td>
<td>0.9% (Dem.)</td>
<td>Assumes a linear seats-votes rel.</td>
</tr>
<tr>
<td></td>
<td>Congress (1948-1970)</td>
<td>1.2% (Dem.)</td>
<td>Assumes a linear seats-votes rel.</td>
</tr>
<tr>
<td></td>
<td>Congress (1870-74)</td>
<td>1.4% (Rep.)</td>
<td>Uses election triplets</td>
</tr>
<tr>
<td>King and</td>
<td>Congress (1966-70)</td>
<td>0.71 (Dem.)</td>
<td>Uses election triplets</td>
</tr>
<tr>
<td>Browning (1987)</td>
<td>Congress (1950-84)</td>
<td>-.92 to +1.12</td>
<td>Negative values are natural log of bias in Repub. direction; positive values are natural log of bias toward Dems. Most states have values between .50 and -0.50.</td>
</tr>
<tr>
<td>King (1990)</td>
<td>Congress (1946-86)</td>
<td>-.11</td>
<td>Value represents sign. Demo. bias</td>
</tr>
<tr>
<td>Campagna and</td>
<td>Congress (1980)</td>
<td>-6.8% to +4.5%</td>
<td>All states agg. produce Demo. bias of 4.4%</td>
</tr>
<tr>
<td>Grofman (1990b)</td>
<td>(Rep.) (Dem.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Congress (1982)</td>
<td>-5.8% to +1.7%</td>
<td>All states, agg. produce Demo. bias of 1.3%</td>
</tr>
<tr>
<td>King and</td>
<td>Congress (1946-86)</td>
<td>-.15 to +.08</td>
<td>Interpreted as in King and Browning 1987. Most values are in -0.11 to +0.02 range.</td>
</tr>
<tr>
<td>Gelman (1991)</td>
<td>Electoral College</td>
<td>-.98 to +.38</td>
<td>Party direction of signs is opposite from King and Browning 1987. Most values are in -0.35 to +0.10 range.</td>
</tr>
</tbody>
</table>
Tufte also points the way toward future research. He illustrates that the uniform partisan swing method is applicable to U.S. House of Representatives elections by charting hypothetical data for 1968. He finds that the partisan bias was approximately 4.8% at 50% of the vote (in favor of the Democrats) rather than the 7.9% bias found for the 1966-70 election triplet. He also notes that a logit model could be used for his exercises, but he abandons this approach in favor of the more easily interpretable coefficients of the linear model.

King and Browning (1987) measure partisan bias in each state for U.S. congressional elections from 1950 to 1984. They do not convert their coefficients into a percentage of bias at 50% of the vote, but rather report the actual regression coefficients. The bias coefficients range from -0.92 (Republican bias in Maine) to 1.12 (Democratic bias in Texas). Thirty-one states had bias coefficients between -0.3 and 0.3. Half of the 48 states in the study exhibit a Republican bias and the other half have Democratic biases. Only six states have bias coefficients that exceed their standard errors; of these six states, three are biased toward the Democrats and three have Republican biases. The authors also note that Democratic partisan bias is significantly related to Democratic party strength (King and Browning 1987, 1265-66). Figure 2.7 illustrates the frequency of partisan bias coefficients in this study.
Figure 2.7. Frequency of Partisan Bias Coefficients for Each State in Congressional Elections, 1950-84.

Source: King and Browning (1987)
Campagna and Grofman (1990b) find that the bias parameters for congressional elections in 1980 and 1982 were significant and worked to the advantage of the Democrats. At 50% of the vote, Democrats would have won 54.4% of seats in 1980 and 51.3% of seats in 1982. Excluding states in which redistricting was performed by courts or commissions, however, reveals that Republicans received the benefit from bias: at 50% of the vote, Republicans win 50.1% of the seats in 1980 and 50.2% of the seats in 1982. In cases in which states with non-legislative redistrictings were excluded and in cases where these states were included, the effects of party control of redistricting were the same. Split-party control resulted in Republican bias in 1980 and in 1982. Democratic control of redistricting resulted in Democratic bias in 1980 and 1982, although bias was statistically significant only in the latter year. Republican control of redistricting ensured a strong Republican bias in 1982, but Republican control of redistricting in 1980 surprisingly resulted in a strong bias in favor of the Democrats (1990, 1249-1252).

King and Gelman (1991), controlling for incumbency advantage, chart partisan bias in congressional elections from 1946 to 1986. The largest bias toward the Republicans occurs in 1946 (log of bias of -0.14). The 1984 election is most biased toward the Democrats (0.07). Most elections
show a bias favoring the Republicans. However, there is a clear trend in bias over time toward the Democrats.

The differences in findings between Tufte and King and Browning probably represent methodological differences and or differences in the time periods each researcher studied. Since Tufte is assuming a linear relationship between seats and votes, the Democratic bias he discovers may be due to the possibility that Democrats benefit from states having majoritarian systems rather than benefitting from actual partisan bias. Additionally, the fact that Tufte is measuring bias using election triplets while King and Browning are using data points from 1950 to 1984 probably account for some differences in findings. Finally, it may well be the case that the difference in the way each researcher aggregates party votes causes differences in outcomes. While Tufte calculates party vote as the aggregate vote for each party, King and Browning employ aggregate district vote percentages for each party as the starting point for their analysis.

In addition, Taagepera and Shugart (1989, 106-107) determine the deviation from proportionality of U. S. House elections in 1984. Their formula is:

\[ D = \frac{1}{2} \sum \left| \frac{s_i - v_i}{s_i} \right| \]

where \( \sum \) is the summation over all parties in the election. They determine that the deviation from proportionality for the election in question is 6.7%. Taagepera and
Shugart (1989, 138-39) also calculate the "break-even point" for both houses of the U. S. Congress. This point represents the share of votes at which the average seats-votes curve intersects with the curve that would represent proportional representation. For the Senate (1912-1970), the break-even point is 47%; for the House of Representatives, this point is 46%. As an example of what the break-even point represents, one can say that when the minority party in Senate elections receives 47% of the vote it will win approximately 47% of the seats. Should the minority party win less than 47% of the votes, it will increasingly win a disproportionately lower percentage of the seats.

Of course, as has been noted previously, researchers have been accused by King and Browning of confounding partisan bias and representational form. Researchers who assume a linear relationship between seats and votes or who do not offer empirical distinctions between form and bias are especially suspect. It is difficult to know if deviation from proportionality and break-even points are results of partisan bias or a majoritarian representational form.

Garand and Parent (1991) estimate bias for the U. S. electoral college for each presidential election from 1872 to 1988. Of these 30 elections, 22 are biased toward the Democrats and eight are biased toward the Republicans. Fourteen of the bias coefficients that favor the Democrats are significant at the .05 level. Of the eight bias
coefficients that favor the Republicans, four are significant at the .05 level. The bias coefficient for the time series as a whole is in the direction of the Democrats but does not reach even the most liberal level of statistical significance. The worst example of bias occurs in 1948, when if Republicans had won 50% of the popular vote they would have won only 27% of the electoral vote.

Additionally, Geer (1986) provides evidence of bias in presidential primaries. He finds that the vote typically needed by all candidates to win 50% of the delegates ranged from 37.7% to 49.7%. Nomination winners, however, uniformly benefit disproportionately from primary rules. The most extreme example is in 1972 when McGovern needed only 30.7% of the votes to win 50% of the delegates. The least amount of bias is found in the Republican primary of 1976 when Ford needed 45.9% of the votes to win 50% of the delegates.

Ansolabahere and King (1990) also find that nomination winners generally (but not uniformly) benefit from a bias in the election system. However, when they control for the election rules of the nomination process, the magnitude of the bias is generally small (and not statistically significant). For the years 1976 to 1988, significant bias is found in 25% of cases involving Republican contests and in 29% of Democratic cases. Republican bias is highest in primaries with proportional winner rules and Democratic
bias is highest in district plurality primaries and caucuses. The worst cases of bias occur in 1988: Bush benefits against Dole in 1988 Republican proportional winner primaries and Dukakis benefits versus Jackson in Democratic district plurality primaries. In only one case, the 1988 Democratic caucuses in which Gore receives a bias against Dukakis, does the eventual nomination winner experience a significantly large bias to his detriment.

In general, there seems to be a bias toward the Democrats in congressional elections. Tufte (1973) finds a Democratic bias of approximately one percent from 1866 to 1970, with slightly higher levels of bias later in the time series. Campagna and Grofman (1990b) also find Democratic biases of 4.4% and 1.3% in congressional elections in 1980 and 1982, respectively. The electoral college system for presidential elections also appears to be biased by the Democrats. Of the 30 presidential elections from 1872 to 1988, 14 were significantly biased in favor of Democrats, four were significantly biased toward the Republicans, and 12 contained very small levels of bias (generally in the direction of the Democrats). In presidential candidate selection processes, winners generally benefit from levels of bias that are usually rather small but occasionally are quite large.
Non-U. S. National Elections: Representational Form

Though most of the literature on the seats-votes relationship is confined to the U. S. context, there is some research on national legislatures other than the U. S. Congress. Because some of the scholars who study comparative legislatures do not attempt to identify separate parameters for bias and form, one must be careful to interpret what they are measuring in order to find statistics that are analogous to the characteristics that are described by King and Browning. Nonetheless, it is possible to discuss in separate sections findings pertaining to representational form and partisan bias for elections other than those occurring in the United States. As such, this section deals with the results of research on representational form for non-U. S. national legislatures. Table 2.4 summarizes the results of these findings.

Rae utilizes bivariate regression to identify patterns of deviation between seats and votes. In the aggregate, he finds that regressing seats on votes for 20 Western democracies from 1945 to 1964 produces the equation (Rae 1967, 70-71, 89):

$$\text{Seats} = -0.0238 + 1.13(Vote)$$

For systems that use a plurality winner (or "first-past-the-post" system) or a majoritarian system (a "winner-take-all" format, which applies only to the Australian lower
## Table 2.4. Summary of Results for
Representational Form, Non-U. S. National Elections

<table>
<thead>
<tr>
<th>Authors</th>
<th>Political System</th>
<th>Range of Scores</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rae (1967)</td>
<td>20 nations (ca. 1945-ca. 1964)</td>
<td>1.13</td>
<td>Assumes a linear seats-votes rel. Also finds that plurality winner systems have swing ratios of 1.20; proportional systems have swing ratios of 1.07.</td>
</tr>
<tr>
<td>Tufte (1973)</td>
<td>Great Britain (1945-70)</td>
<td>2.83</td>
<td>Assumes a linear seats-votes rel.</td>
</tr>
<tr>
<td></td>
<td>New Zealand (1946-69)</td>
<td>2.27</td>
<td>Assumes a linear seats-votes rel.</td>
</tr>
<tr>
<td>Taagepera and Shugart (1989)</td>
<td>Canada Japan Austria Switzerland Italy Finland Netherlands (ca. 1945-ca. 1977)</td>
<td>1.01-2.86</td>
<td>Most nations are in the 1.05 to 1.30 range.</td>
</tr>
<tr>
<td>King (1990)</td>
<td>Great Britain (ca. 1919-ca. 1987)</td>
<td>0.87-1.82</td>
<td>Most nations are in the 1.09 to 1.61 range.</td>
</tr>
</tbody>
</table>
house and the first ballot vote for the French National Assembly), the comparable equation is:

\[ \text{Seats} = -0.063 + 1.20(Vote) \] (2.9)

The same equation applied to proportional representation systems (or variants of proportional representation systems) produces:

\[ \text{Seats} = -0.0084 + 1.07(Vote) \] (2.10)

Rae also illustrates that the average change of vote shares of 2.58% for all parties receiving greater than 2.0% of the vote in proportional representation formula countries equates to a 2.68% average change in seat shares. The net average magnification of changing party strength is 0.10%. For plurality and majority formulae, the 3.24% average change in vote shares produces a 6.86% average change in seat shares; net average magnification of changing party strength is 3.62% (Rae 1967, 101).

Using longitudinal data on legislative elections from Great Britain (1945-70) and New Zealand (1946-69), Tufte (1973) finds that only elections in Great Britain produce representation coefficients (analogous to the exponent in the swing-ratio equation) that are close to the 3.00 specified by the cube law. In fact, the elections in Great Britain produce a swing ratio of 2.83. In New Zealand, the swing ratio is 2.27.

Taagepera and Shugart (1989, 193) report representational form coefficients for several Western democracies in
the post-War era. They find that Canada (1963-74) produces the rather large coefficient of 2.86. Other countries exhibit more proportional forms of representation: Japan (1963-76) has a coefficient of 1.30; Austria's (1945-70) form parameter is 1.20; Switzerland (1947-75) produces a form value of 1.13; the form parameter for Italy (1958-76) is 1.05; Finland (1962-75) produces a coefficient of 1.07; and the Netherlands (1963-77) exhibits a form parameter of 1.01.

King (1990) examines the electoral responsiveness of elections in a number of democracies. He discovers that election rules generally have an effect on form parameters. For example, in a nation such as Canada (1921-1984) that has electoral systems with single-member districts, representational form values are relatively large. The representational form parameter for Canada is 1.82. In Austria (1945-83) and Japan (1958-86), two countries with modified proportional representation rules, the representational form parameter values are 1.52 and 1.47, respectively. Nations having proportional rules produce expected results. Italy (1946-87) has a 1.11 representational form. The form parameter for the Netherlands (1946-86) is 1.09. Finland (1919-83) produces a form parameter of 0.92. Finally, the value of the form parameter in Switzerland (1919-83) is 1.11.
As one might expect, representational form values for national legislatures outside the United States vary between proportional representation and majoritarian patterns. Another unsurprising finding is that election rules at the district level strongly affect the representational form coefficient. Specifically, plurality or majority winner rules in single-member districts and modified proportionality plans produce elections with larger representational form coefficients than pure or nearly pure proportional representation plans. In general, the findings suggest that single-member district election rules in Great Britain, Canada, and New Zealand result in representational form coefficients that are similar to the form values found in U. S. congressional elections. By the same token, as would be expected, the U. S. Congress exhibits representational form values that tend to be larger than those in elections in nations that do not have single-member district plurality or majority winners.

Non-U. S. National Elections: Partisan Bias

As is the case in U. S. congressional elections, another characteristic of national legislative elections outside the U. S. is the presence or absence of partisan bias in the election system. Partisan bias is important because it can affect partisan seat distribution in the legislature and can conceivably affect the legislature's ability to represent the public in the ways discussed in
Chapter One. Though the literature on bias (as was true of representational form) is less extensive in the non-U. S. setting, there are still some research efforts that are relevant to the discussion. A summary of the results of the studies concerned with partisan bias in these elections is contained in Table 2.5.

Rae equates deviation from proportionality at 50% of the vote as bias. In his 20 nation study, he finds that in systems having plurality or majority winner rules, 50% of the vote equates to 53.7% of the seats. In the cases in which proportional winner rules prevail, 50% of the vote corresponds to 52.7% of the seats (Rae 1967, 90).

Tufte finds that party bias does exist for Great Britain in 1945 to 1970 and for New Zealand in 1946 to 1969 (See Tufte 1973, 543, Table 1). In the former, the Labour Party requires 50.2% of the votes to win a majority of the seats. Thus, Tufte concludes that the bias in Great Britain is 0.2% in favor of the Conservative Party. In New Zealand, since the Labour Party needs 51.4% of the votes to gain a legislative majority, the National Party is the beneficiary of a 1.4% bias.

As noted earlier, the closest thing to bias that Taagepera and Shugart (1989) estimate is deviation from proportionality. For the 48 countries they study, they use data from 1945-85. The smallest deviation from proportionality occurs in Greenland (0.2%). The country with the
Table 2.5. Summary of Results for Partisan Bias, Non-U. S. National Elections

<table>
<thead>
<tr>
<th>Authors</th>
<th>Political System</th>
<th>Range of Scores</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rae (1967)</td>
<td>20 nations</td>
<td>2.7%-3.7%</td>
<td>Assumes a linear seats-votes rel. These figures represent what the typical party would receive at 50% of the vote in proportional and majority/plurality systems, respectively. (ca. 1945-ca. 1964)</td>
</tr>
<tr>
<td>Tufte (1973)</td>
<td>Great Britain</td>
<td>0.2%</td>
<td>Assumes a linear seats-votes rel. Bias is in favor of the Conservative Party. (1945-70)</td>
</tr>
<tr>
<td></td>
<td>New Zealand</td>
<td>1.4%</td>
<td>Assumes a linear seats-vote rel. bias is in favor of the National Party. (1946-69)</td>
</tr>
<tr>
<td>King (1990)</td>
<td>Great Britain</td>
<td>0.00-1.60</td>
<td>Interpreted as in King and Browning 1987. The largest bias is the Conservative Party bias vis-a-vis the Liberal and Alliance Parties in Great Britain. Most values range between 0 and 0.10 (very little bias). Canada, Austria, Japan, Italy, Netherlands, Finland (ca. 1919-ca. 1987)</td>
</tr>
</tbody>
</table>
largest deviation from proportionality is Sri Lanka (36.7%) (1989, 106-107). To use Sri Lanka as an example, the authors explain that deviation from proportionality can be interpreted to mean that "compared to perfect [proportional representation, 36.7%] of the seats are shifted from some parties to some other parties (1989, 105)." The median value of deviation from proportionality in their study is 7.6%.

King (1990, 171-74) calculates bias in multiparty democracies by first estimating the seats-votes relationship for one party assuming an absence of bias and then applying the same representational form parameter to other party's seats-votes curves. If a numerical value is produced for the other parties, then it can be said that bias exists in the relationships between each pair of parties (i.e., the original party and each other individual party). In Great Britain, he finds that the Conservative-Labour party contest produces a 0.05 bias in favor of the Conservatives. The Conservative Party also enjoys a very large 1.60 bias when pitted against the Liberal and Alliance Parties. In Canada, the Conservative Party benefits from a very small bias against the Liberal Party (0.01) but a rather large bias against the National Democratic Party and other parties. In proportional and modified proportional election rule systems, bias between the reference party and other parties is insignificant. There are small biases
against the Socialist Party in Austria, the Liberal Democratic Party in Japan, the Christian Democratic Appeal Party in the Netherlands (when matched with the other major parties) and the Social Democrats in Finland (when pitted against other major parties). In Italy, there is a small bias in favor of the Christian Democrats. Finally, in Switzerland, the Social Democrats benefit from a small bias vis-a-vis the People’s Party and other parties but are hurt by a small bias when matched against the Radical Democrats and the Catholic Conservatives. In general, King’s work reveals that nations with single-member districts have larger biases and biases that work more to the advantage of the major parties than do modified proportional representation and proportional representation systems.

The general consensus seems to be that bias is more prevalent in single-member district elections than in modified proportional representation or pure (or nearly pure proportional representation systems. Bias in Great Britain, Canada, and New Zealand seem to be comparable to the levels of bias found in U. S. congressional elections (in particular, see King 1990, Tufte 1973). Thus, it seems that election rules rather than other idiosyncratic, country-specific variables have a strong effect on both representational form and partisan bias in national legislative elections.
U. S. State Legislative Elections: 
Representational Form

Much of the research on the relationship between partisan votes and partisan seats, as has been noted, has been conducted on the U. S. Congress. However, the existence of new data now allows for similar research to be conducted for state legislative elections in almost all the states. Due to this new data, a substantial body of literature has arisen in the past few years in which U. S. state legislative elections have been analyzed. As is the case with national elections, it is possible to identify measures of representational form and partisan bias in legislative elections in the U. S. states. In this sections, I will discuss the findings on representational form in state legislative elections. A summary of these results is provided in Table 2.6

Tufte (1973) estimates the responsiveness of the election systems of three state legislatures. Michigan (1950-68) had a responsiveness coefficient of 2.06. New York (1934-66) had a responsiveness coefficient of 1.28. New Jersey is found to have had two different patterns. From 1926-47, the responsiveness coefficient for New Jersey was 2.10. In the later period, 1947-69, the responsiveness coefficient in New Jersey was 3.65.

Two sets of researchers examine legislatures in individual states. Scarrow (1982, 232-33) estimates the average swing ratio in the New York State Assembly to be 1.90
### Table 2.6. Summary of Results for Representational Form, U. S. State Elections

<table>
<thead>
<tr>
<th>Authors</th>
<th>Political System</th>
<th>Range of Scores</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tufte (1973)</td>
<td>Michigan (1950-68)</td>
<td>2.06</td>
<td>Assumes a linear seats-votes rel.</td>
</tr>
<tr>
<td></td>
<td>New York (1934-66)</td>
<td>1.28</td>
<td>Assumes a linear seats-votes rel.</td>
</tr>
<tr>
<td></td>
<td>New Jersey (1926-47)</td>
<td>2.10</td>
<td>Assumes a linear seats-votes rel.</td>
</tr>
<tr>
<td></td>
<td>New Jersey (1947-69)</td>
<td>3.65</td>
<td>Assumes a linear seats-votes rel.</td>
</tr>
<tr>
<td>Scarrow (1982)</td>
<td>New York Assembly (1952-64)</td>
<td>1.90</td>
<td>Average swing ratio over time period</td>
</tr>
<tr>
<td></td>
<td>New York Assembly (1966-78)</td>
<td>1.50</td>
<td>Average swing ratio over time period</td>
</tr>
<tr>
<td>Browning and King (1987)</td>
<td>Indiana House (1972-84)</td>
<td>2.05</td>
<td></td>
</tr>
<tr>
<td>King (1989)</td>
<td>Indiana</td>
<td>0.35-2.84</td>
<td>Most values for indiv. elections range from 0.50 to 1.20</td>
</tr>
<tr>
<td></td>
<td>Connecticut</td>
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<td></td>
<td>Pennsylvania</td>
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<td>Wisconsin</td>
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<td></td>
<td>Iowa</td>
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<tr>
<td></td>
<td>Washington</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(1968-80)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gryski, Reed, Elliott (1990)</td>
<td>42 states (1976-84)</td>
<td>0.89-9.36</td>
<td>All states agg. produce 3.22</td>
</tr>
<tr>
<td>Niemi and Jackman (1990)</td>
<td>46 states (1970-86)</td>
<td>1.13-2.28</td>
<td>Results are reported in agg., controlling for party control of redistricting and by decade.</td>
</tr>
<tr>
<td>Campagna and Grofman (1990a)</td>
<td>15 states</td>
<td>0.52-4.62</td>
<td>Most values for indiv. elections range from 0.85 to 2.69.</td>
</tr>
</tbody>
</table>
from 1952-64 and 1.50 from 1966-78. For the New York State Senate, the comparable figures for the same years are 2.10 and 1.40, respectively. Browning and King (1987) find that the Indiana House of Representatives (from 1972-84) had a representational parameter of 2.05 (between proportional and majoritarian). The Indiana Senate over the same time period basically operated as a majoritarian system (responsiveness parameter of 3.26).

King (1989) examines representational form in six state legislatures from 1968 to 1980. He utilizes a version of the King and Browning equation which he upgrades to "control" for partisan swing and incumbency voting. He finds that bipartisan redistricting in Pennsylvania and Wisconsin resulted in a decrease in responsiveness in the middle range of the distribution (i.e., the system became more proportional); this finding is consistent with the widely-held notion that bipartisan redistricting is used to protect the incumbents of both parties. Nonpartisan redistricting in Iowa and Washington caused the representation coefficient to rise dramatically in the election subsequent to redistricting, meaning that vote swings toward either of the parties resulted in larger shifts in seat changes than before redistricting in relatively competitive districts. King also discovers, however, that the immediate effects of partisan and nonpartisan redistricting diminished in elections from 1974 to 1980 (King 1989, 813-20).
Gryski, Reed, and Elliott (1990) estimate the representative form in general elections to the lower houses of 42 state legislatures from 1976 to 1984:

\[ \ln \left( \frac{S}{1 - S} \right) = a + n \ln \left( \frac{V}{1 - V} \right) + e \] (2.11)

They test the null hypothesis that the representation coefficient did not differ significantly from 3.0. In only five states can the null hypothesis for representation be rejected at the .05 level of statistical significance. The five states that deviate from the "majoritarian" pattern tend toward proportionality (the highest coefficient in these states was 2.09). However, in the aggregate, the 42 states had an average representation coefficient of 3.22, almost mirroring the cube law value of 3.00. Twenty-three states produced representation coefficients greater than 2.50, and only three states had coefficients greater than 4.50. Thus, while the average representational coefficient was greater than 3.00, most states exhibited a coefficient very close to what one would expect in a majoritarian system.

Niemi and Jackman (1991) are concerned with the effects of redistricting on the swing ratio in state lower house elections. For the purpose this dissertation, it should be noted that they measure responsiveness for the 1970s, the 1980s, and 1970 to 1986. In one set of equations, they control for party control of state government and in another they control for partisan control of the
redistricting process. They find that only in states in which Republicans dominated state government in 1982-86 and the redistricting process in 1970-80 did the responsiveness parameter exceed 2.00. It is discovered that states exhibited representational systems that were more proportional than had been revealed in studies having shorter time series.

Finally, Campagna and Grofman (1990a) and Campagna (1991) measure partisan bias and responsiveness for each election to the upper and lower houses of California, Colorado, Connecticut, Delaware, Iowa, Kentucky, Michigan, Missouri, New York, Ohio, Oklahoma, Pennsylvania, Rhode Island, Utah, and Wisconsin from 1972 to 1986. Since the present study involves lower house elections, only the findings for these houses in the Campagna and Grofman study are noted here. The median swing ratios for the 15 states ranged from 0.85 in Kentucky to 2.69 in Connecticut.

The evidence seems to indicate that, on average, the representational form coefficients for state legislative election systems are closer to proportionality than are the representational coefficients for U.S. congressional elections. However, comparisons from two studies indicate that median values from congressional and U.S. state legislative elections do not appear to differ as much as mean values (See Gryski, Reed, and Elliot 1990, 141, 148-50; King and Browning 1987, 1269). The winner-take-all values
for five states in federal elections most likely inflate the average representational coefficient values in congres­sional elections.

U. S. State Legislative Elections: Partisan Bias

U. S. state legislative elections, like all other elections, contains certain levels of partisan bias. The research pertaining to partisan bias in these elections is discussed in the following paragraphs. In addition, a summary of the results from this literature is found in Table 2.7.

Tufte identifies partisan bias in a number of state legislative election systems. He finds that Michigan (1950-1968) had a partisan bias toward the Republicans of 2.1%. The election system in New York had a Republican bias of 4.3% from 1934 to 1966. New Jersey exhibited a Republican bias of 11.3% from 1926 to 1947, but the Republican bias had declined to 2.0% in the 1947-1969 period.

Using the uniform partisan swing approach between 40% and 60% of the two-party vote, Scarrow (1982, 1983) measures partisan bias as the difference in the seats won by the two major parties given the same percentage of the vote. Rather than applying regression to the data, he simply reports the partisan differences in the seats won given the raw hypothetical vote at 5% increments. He reports findings for the New York State Assembly and the New York State Senate for 1952-64 and for 1966-78. He
<table>
<thead>
<tr>
<th>Authors</th>
<th>Political System</th>
<th>Range of Scores</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tufte (1973)</td>
<td>Michigan</td>
<td>2.1% (Rep.)</td>
<td>Assumes a linear seats-votes rel.</td>
</tr>
<tr>
<td></td>
<td>New York</td>
<td>4.3% (Rep.)</td>
<td>Assumes a linear seats-votes rel.</td>
</tr>
<tr>
<td></td>
<td>New Jersey</td>
<td>11.3% (Rep.)</td>
<td>Assumes a linear seats-votes rel.</td>
</tr>
<tr>
<td></td>
<td>New Jersey</td>
<td>2.0% (Rep.)</td>
<td>Assumes a linear seats-votes rel.</td>
</tr>
<tr>
<td>Scarrow (1982)</td>
<td>New York</td>
<td>0.6%-12.6%</td>
<td>Range of bias at various % of vote. Bias for Repubs.</td>
</tr>
<tr>
<td></td>
<td>New York</td>
<td>5.3%-11.3%</td>
<td>Range of bias at various % of vote. Bias for Dems.</td>
</tr>
<tr>
<td>King (1989)</td>
<td>Indiana</td>
<td>-.70+-1.10</td>
<td>Interpreted as in King and Browning 1987. Most values range from -.10 to +.35.</td>
</tr>
<tr>
<td></td>
<td>Connecticut</td>
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<tr>
<td></td>
<td>(1968-80)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gryski, Reed, Elliott (1990)</td>
<td>42 states</td>
<td>-.37+-0.33</td>
<td>Interpreted as in King and Browning 1987. All states agg. produce .02.</td>
</tr>
<tr>
<td>Niemi and Jackman (1990)</td>
<td>46 states</td>
<td>-5.5%+-4.8%</td>
<td>Results in agg., control. for party control of redist. by decade. Most values, -3.5% to 0</td>
</tr>
<tr>
<td></td>
<td>(1970-86)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Rep.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Dem.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campagna and Grofman (1990a)</td>
<td>15 states</td>
<td>-30.8%+-28.1%</td>
<td>Bias at 50% vote. Most values, -.43 to +.43.</td>
</tr>
</tbody>
</table>
finds that Republicans in the Assembly benefitted from a bias in the earlier period that ranged from 0.6% at 40% of the vote to 12.6% at 50% of the vote. In the Senate in the earlier period, Republicans were recipients of a large bias in the 45% to 55% range, but at 40% of the vote and at 60% of the vote Democrats received a small bias in seats won.

In the 1966-78 period, Scarrow finds that the direction of bias was changed for the Assembly but remained the same for the Senate when compared with results in the earlier period. The bias in favor of the Democrats in the Assembly in the latter period ranged from 5.3% to 11.3%. At 45% to 55% of the vote the Republican bias in the Senate ranged from 0.7% to 4.6% while the Senate Democratic bias at the 40% and 60% points was 10%. (See Scarrow 1982, 232-33). In a later replication of his work, Scarrow finds that the Democrats benefit from a bias ranging from 12.6% to 18.6% in the Assembly in 1980. In the Senate in 1980, there is no bias in the 45% to 55% vote range but there is bias towards the Democrats of 11.7% at the 40% and 60% points (Scarrow 1983, 107).

Browning and King (1987) also report bias findings in their study of the Indiana state houses. They find partisan bias in elections to both the upper and lower houses of the Indiana state legislature from 1972 to 1984. The Indiana House of Representatives had a slight Republican bias parameter (not percentage of the vote) of -0.25. The
Indiana Senate also was slightly biased toward the Republicans (parameter of -0.11).

King (1989) measures partisan bias in state legislative elections that followed the 1970 redistricting effort in six states. He finds that Republican-controlled redistricting favored the Republicans in the election immediately following the 1970 redistricting efforts in Indiana and Connecticut. Bipartisan redistricting in Pennsylvania and Wisconsin resulted in a decrease in partisan bias. Nonpartisan redistricting did produce an immediate reduction in the already small Republican bias in Iowa, but the small Democratic bias in Washington was increased slightly. In five of the six states, however, the immediate effects of redistricting on partisan bias were diminished as partisan bias fluctuated in elections from 1974 to 1980 (King 1989, 813-20).

Gryski, Reed, and Elliott (1990) discover partisan bias in a number of states in general elections to the lower houses of 42 state legislatures from 1976 to 1984. They find that eight states had levels of partisan bias that exceed the .05 statistical level. In addition, there appears to be more partisan bias in state legislative elections than in congressional elections when one disaggregates for the states (with six of the eight state legislative election systems being biased toward the Democrats).
Niemi and Jackman (1991) study state legislative elections in 47 states (in the aggregate) in the 1970s, from 1982 to 1986, and from 1970 to 1986 to determine the effect of redistricting on bias and representation. Bias parameters were significant and in the expected direction (i.e., partisan redistricting produces a bias in favor of the party in control and other forms of redistricting restrict bias) in all the equations in the 1970s and for the 1970-86 data set. States with divided control of state government and bipartisan control of redistricting tended to have slight biases in favor of the Republicans. Party biases at 50% of the vote ranged from 5.5% in favor of the Republicans in the states in which Republicans controlled redistricting in the 1970s to almost zero in five of the six equations dealing with the 1982-86 period. In the latter period, curiously enough, only in states in which control of government was divided did significant bias exist (2.2% in favor of Republicans).

Campagna (1991) and Campagna and Grofman (1990a) measure partisan bias in individual state legislative elections in 15 states from 1972 to 1986. Significant bias was found in at least half the elections for 13 of the 15 states. In the states having bias, both parties benefitted almost equally in four states, Democrats received the advantage in five states, and Republicans were the beneficiaries in four states.4
Obviously, there are a plethora of results concerning partisan bias in the research conducted on U. S. state legislative elections. Many of the findings seem to be contingent on the methods employed, the states used, and the years of the study. The only general statements that can be supported by the literature are that elections in Kentucky and California have been biased toward the Democrats, elections in New York from 1934 to 1964 have been biased in favor of the Republicans, elections in New York from 1964 to 1986 have seen a Democratic bias, and partisan control of redistricting seems to produce an increase in bias toward the controlling party in the election immediately subsequent to redistricting.

CONCLUSION

This chapter has consisted of a summary of the literature on the seats-votes relationship. In this chapter, I have described the various methodological approaches and techniques of using data that have emerged in this line of research. I have also attempted to deal with potential problems that one must face in performing an analysis on the relationship between partisan votes and party seat allocation in legislative elections.

Furthermore, this chapter has included a summary of the results of research conducted on representational form and partisan bias in U. S. national elections, non-U. S. national elections, and U. S. state legislative elections.
In general, the results concerning representational form suggest that in the United States, the electoral college system of electing the president has the highest value for representational form. Winner-take-all presidential primaries also exhibit a highly majoritarian representational form. Congressional elections and U. S. state legislative elections tend to be slightly majoritarian. Proportional or nearly proportional winner rules in U. S. presidential primaries produce representational form values that are the most nearly proportional of the U. S. election systems. In examining the cross-national results, it was found that single-member district elections at the national level tend to produce higher representational form parameters and higher swing ratios than do national level elections in countries having proportional representational allocation of seats at the district level.

The findings for bias are quite eclectic. The general consensus is that the Democrats benefit from a bias in congressional elections and in presidential elections. The comparative national election literature suggests that bias is more likely to occur in elections with single-member districts than in multimember district elections. At the U. S. state level, the findings vary from study to study and from election to election. Democratic biases are prevalent in Kentucky and California and in New York from 1934 to 1966. Republicans receive a bias in New York after
In addition, in both state and congressional elections in the U. S., party control of redistricting tends to strengthen the bias toward the party that controls redistricting (though this tendency is stronger in state legislative elections in the 1970s than in the 1980s).

The differences in findings for the sketchy attempts to measure bias and representational form in U. S. state legislative elections call for further research. Data on state legislative general elections now exist for 49 states from 1968 to 1986. An attempt to measure bias and responsiveness in each election and for the entire time series (including the 1968 election) should, therefore, be undertaken.
1. In two other similar studies by Scarrow (1982, 1983) based on data from both houses in New York State, the author uses hypothetical data from 40% of the vote to 60% of the vote to calculate partisan bias.

2. The usual method of employing the uniform partisan swing approach, particularly in strong two-party systems, is to measure the seats-votes relationship using a certain number of points surrounding the 50% mark (such as the 55%-45% and the 60%-40% utilized by Scarrow). However, as Grofman (1983) hints, one can measure bias at any number of points on the seats-votes curve. One could argue that it is a more realistic assessment of the election system if all elections are included and bias is measured at each point (i.e., from 0% to 100% of a party’s vote) on the seats-votes graph. This would certainly be the case for elections in southern states, for example. In the latter example, the uncontested elections would certainly have an effect on the calculation of seats-votes curves via regression; however, this may be a better way to measure the seats-votes relationship than using only those districts in which Republicans contest an election (which would certainly overestimate Republican strength in a state).

3. For a thorough treatment of how use of different methods of aggregating election results could affect seats-votes calculations see Campbell 1991.

4. It should be noted that Backstrom, Robins, and Eller (1973) measure partisan bias without using techniques of formal modelling. Their method involves using one or more previous election(s) to develop a standard for "normal partisan vote" and then subtracting the winning party’s vote from the normal vote in each precinct. If the majority party is dominant in exactly 50% of the districts after the subtraction is made, then the redistricting plan is judged to be fair. If the majority party is overrepresented or underrepresented but the redistricting formula met judicially-accepted criteria in regard to compactness of districts, deviation from population equality, adherence to subdivision lines, and size of the assembly vis-a-vis the population, then "gerrymandering" does not exist. If the majority party is overrepresented or underrepresented and there is room for reducing the partisan advantage under the criteria cited above, then a gerrymander does not exist. Using this method, they find that in the 1972 Minnesota Senate election, the dominant Democrats controlled only 32 of 67 districts after their totals were subtracted from their normal vote. Since the Democrats "controlled" 48% rather than 50% of the districts, they
received 48/50 or 96% of their "fair representation." Thus, the Democrats were underrepresented by 4% even though they won 66% of the seats with only 54.27% of the vote (1973 1135-38).
CHAPTER THREE: PARTISAN BIAS AND REPRESENTATIONAL FORM IN THEORETICAL PERSPECTIVE

In the last chapter, the discussion centered on the various ways in which the seats-votes relationship has been defined by researchers and on the methods used to measure characteristics of the seats-votes relationship. One of the approaches that was described was the King and Browning formulation of representational form and partisan bias. In this chapter, I explore in more detail the theoretical foundations of the two characteristics of the seats-votes relationship studied by King and Browning.

I begin this chapter with two sections containing a discussion of the theory behind the concepts of representational form and partisan bias, respectively. Illustrations are included so that the reader may draw a visual image of the distinction between form and bias. I then describe the general relationship between seat allocation and partisan votes in an electoral system and the equations that are used to measure this relationship.

In the fourth section of the chapter, I describe the concepts that may explain why certain patterns of representational form occur in particular election systems. These concepts can be categorized as district-level partisan competition variables and election rule variables. The fifth section of this chapter consists of a discussion of partisan gerrymandering and other variables that are
thought to explain partisan bias in an electoral system. Finally, I conclude the chapter with a brief summary.

THE CONCEPT OF REPRESENTATIONAL FORM

The relationship between partisan votes and partisan seat allocation to legislatures is a crucial element in the democratic political process. Because there is such a practical importance attached to the seats-votes relationship, the relationship should be of concern to those who are interested in democratic theory and the theoretical underpinnings of representation. Two characteristics of the seats-votes relationship have been cited in the political science literature as being important to an understanding of the issue in question: representational form and partisan bias.

Representational form has not only been defined by political scientists in a number of ways, but different terms have even been used to identify this concept. Representational form, a term made popular by King and Browning (1987), has been called the "swing ratio" (when it was used to specify a linear relationship between seats and votes) and "responsiveness" as well (Tufte 1973). Regardless of the name used to describe the phenomenon in question, the idea refers to the functional relationship between partisan votes and partisan legislative seats (King and Browning 1987, 1253; Garand and Parent 1991, 2).
As was noted above, the functional form of the seats-votes relationship can take on an almost endless number of patterns. However, one can visualize the concept of representational form by examining three ideal types of seats-votes curves. Figure 3.1 illustrates these three different ideal types.

First, the diagonal line is indicative of a proportional representational form. In proportional representation, a particular percentage of votes won by a party will result in the party winning the exact same percentage of legislative seats. Second, a winner-take-all system is illustrated by the curve that resembles a "straightened Z." In this case when one party wins 50% plus 1 vote, the party wins all the seats in the legislature. Finally, the S-shaped curve in Figure 3.1 represents the "cube law" type of majoritarian representational form system. Technically, any system that has a representational form value greater than one and less than infinity is majoritarian; a representational form parameter value of three is only one of an almost infinite number of possible majoritarian forms. In general, however, a majoritarian form is characterized by a party winning few seats until it wins close to 50% of the vote. When the party approaches the 50% mark, it begins to win a larger than 1% increase in seats for each additional 1% of the votes it garners. Likewise, as a party wins more
Figure 3.1.
Three Examples of Representational Form, No Partisan Bias

Source: Adopted from King and Browning (1987)
than a majority of votes, the greater the number of votes
won the fewer additional seats it wins.

King and Browning (1987) suggest that each type of
representation is "fair," although each type presents a
unique contribution to representation and to governance.
On the one hand, proportional representation best reflects
underlying voter preferences. Because the percentage of a
party's votes equals the percentage of legislative seats
won by the party, each party is guaranteed representation
in the legislature. Minority viewpoints are more likely to
be aired since minority parties will hold relatively large
numbers of legislative seats in proportional representation
systems. On the other hand, a winner-take-all system
allows the winning party to govern more easily since there
will be no opposition party in the legislature. The major­
itarian system perhaps moderates between the other two
ideal types. In a majoritarian system, voter preferences
are mirrored relatively closely but the winning party does
receive an inflated majority of seats. While proportional
representation might hamper the ability of a winning party
to govern and a winner-take-all system grossly inflates
voter preferences, the majoritarian system encourages
majorities while protecting minority views to some degree
(King and Browning 1987, 1255).
THE CONCEPT OF PARTISAN BIAS

In addition to representational form, King and Browning (1987) argue that there is another important characteristic of any electoral system. This second characteristic they dub partisan bias, which they define as (1987, 1251) "[the introduction of] asymmetry into the seats-votes relationship, resulting in an unfair partisan differential in the ability to win legislative seats: the advantaged party will be able to receive a larger number of seats for a fixed number of votes than will the disadvantaged party." Although Tufte (1973, 542) defines bias as the difference between 50% and the percentage of the vote needed by a particular party to win 50% of the legislative seats, King and Browning (1987), Garand and Parent (1991), and King (1990) reach the conclusion that bias can be calculated at any vote percentage if one has a measure of representational form for the system. The point, made clear by King and Browning, is that "the precise effect of partisan bias depends on the specific form of democratic representation (1987, 1252)."

While the effect (but not the value) of bias is dependent on the measure of representational form, King and Browning illustrate that the two concepts are empirically distinct. They note that many earlier practitioners failed to draw a distinction between bias and form. In addition,
they suggest that some researchers assumed that more majoritarian systems were inherently biased.

As was the case with representational form, partisan bias can be depicted in graphic detail. One can illustrate bias by charting a party's observed seat-votes curve and comparing the observed curve with a curve representing the seats-votes relationship in which no bias is assumed to exist. Figure 3.2(a) illustrates partisan bias in a proportional system, and Figure 3.2(b) represents bias in a majoritarian election system.

In Figure 3.2(a), one can identify the "no bias" curve as the perfectly diagonal line that is equivalent to the proportional representation curve in Figure 3.1. The convex and concave curves surrounding the no bias curve represent election systems having certain specified levels of partisan bias. The top curve, in which the natural log of bias equals 1, is indicative of a system that is biased in favor of the Republicans. At 50% of the votes, Republicans win almost 80% of the seats. The bottom curve illustrates a bias in favor of Democrats, with Republicans gaining slightly more than 20% of the seats despite winning 50% of the votes. Figure 3.2(b) is comparable to Figure 3.2(a) except that the former represents a majoritarian election system. One can use this technique to visualize the percentage of the seats that a party would win given any particular percentage of the vote won by that party.
Figure 3.2(a)
Various Seats-Votes Curves,
No Partisan Bias

Figure 3.2(b)
Hypothetical Seats-Votes Curves
for Proportional System, Various Biases

Figure 3.2(c)
Hypothetical Seats-Votes Curves
for Majoritarian System, Various Biases
Thus, King and Browning suggest that there are two important characteristics to the seats-votes relationship. Representational form refers to the general pattern by which seats change from one party’s control to the other party’s control given shifts in the partisan percentage of the vote. Partisan bias pertains to asymmetry in the representational form pattern. In the literature on the seats-votes relationship, a number of researchers have advanced hypotheses concerning why certain patterns of representational form exist and why partisan bias may be present in an election system.

SEATS AND VOTES AND THE EQUATIONS THAT MEASURE THEM

In early studies (Dahl 1954; Tufte 1973) it was assumed that the relationship between seats and votes was linear. That is to say, it was believed that a one percent change in partisan percent of the vote would correspond with a fixed percentage change in seat allocation and that this relationship would be uniform over the entire range of partisan vote and seat allocation possibilities. For example, if a shift in Democratic vote from 50% to 51% of the vote would cause a 3% increase in Democratic seats, it was assumed that a shift in Democratic vote from 75% to 76% of the vote would also result in a 3% increase in Democratic seats. The regression equation that denotes this relationship is:
\[ S = b \cdot V + e, \]  
\[ (3.1) \]
where \( S \) is the percentage of seats for a certain party, \( V \) is the percentage of votes for the same political party, \( b \) is the regression coefficient for the vote variable, and \( e \) is the error term.

However, Tufte (1973) notes that nonlinear specifications may better describe the relationship between partisan vote changes and seat changes, particularly as one moves away from the 50% point on a seats-votes graph. As noted in the last chapter, Kendall and Stuart (1950) popularized a particular nonlinear specification of the seats-votes relationship. Their equation, which denotes the purported cube law of single-member plurality elections is:

\[ \frac{S}{1 - S} \cdot \frac{V}{1 - V}^3, \]  
\[ (3.2) \]
where \( S \) = number of seats won by a party, \( V \) = number of votes won by the same party.

Again, Tufte (1973) (as well as Grofman 1983; King and Browning 1987; Garand and Parent 1991) points out that the cube law does not apply universally to election outcomes in majority or plurality winner single-member districts. Additionally, the seats-votes curve suggested by the cube law is not always characterized by a lack of bias (i.e., at the 50% vote mark, a party might not necessarily win 50% of the seats). Finally, Tufte (1973, 545-46) criticizes the cube law as being atheoretical and deterministic; thus, reliance on it tends to hide important political issues.
A different and perhaps better way to specify a non-linear relationship between seats and votes is to formulate an equation similar to Equation 3.2 but allow the exponent on the right-hand side of the equation to remain unspecified. The exponent will then receive a value based on empirical configurations of seat changes and vote changes rather than the atheoretical whims of the researcher.

Equation 3.2 can be transformed to:

\[
\frac{S}{1 - S} = b\left(\frac{V}{1 - V}\right)^c, \tag{3.3}
\]

where \(S\) and \(V\) are defined as in Equation 3.3, \(b\) is a parameter that measures partisan bias, and \(c\) is parameter that measures representational form.

Tufte (1973, 546-47) describes a further transformation of Equation 3.3 thusly:

[A] logit model ... is fully as effective as the linear model and statistically more graceful. Define the odds in favor of a party’s winning a seat as \(S / (1-S)\) and the vote odds as \(V / (1-V)\). The logit model is the regression of the logarithm of seat odds against the logarithm of vote odds ... Since both variables are logged, the estimate of the slope, \(b_1\), is the estimated elasticity of seat odds with respect to vote odds; that is, a change of one per cent in the vote odds is associated with a change of \(b_1\) percent in seat odds ... The logit model also provides a direct test of the hypothesis that an electoral system is unbiased, since \([a_i] = 0\) in an unbiased system.

The equation to which Tufte addresses his comments is:

\[
\begin{align*}
S \log_e & = \log a_1 + b_1 \log_e \frac{V}{1-V}, \tag{3.4}
\end{align*}
\]

where \(S\) and \(V\) are defined as in Equation 3.1.
"Borrowing liberally from King and Browning [1987]," Garand and Parent (1991, 4) note that $a_i$ is the bias parameter and $b_i$ is the representational form parameter. Assuming an absence of bias in a particular electoral system (i.e., $\log a_i = 0$), one can still test to see if the election system is proportional. If $b_i = 1$, then the relationship between seats and votes is proportional. Since $b_i$ can take on any value, it is possible that $b_i$ can be greater than one. In the latter case, the representational system would be majoritarian; a one percent change in partisan votes would equate to a larger than one percent change in partisan seats in the middle of the distribution. It should be noticed that if $b_i = 3$, then the cube law specification of majoritarian representation is in effect. It is possible (but unlikely) that $b_i$ will take on an infinitely large value and thus identify a winner-take-all electoral system. In addition, the value of $\log a_i$ can be greater than 0 and indicate a bias toward one party or less than 0 and illustrate a bias toward the other party.

THEORETICAL EXPLANATIONS OF REPRESENTATIONAL FORM

Why are some electoral systems proportional, majoritarian, or winner-take-all? In general, scholars have suggested two categories of explanations for the representational form of an electoral system. First, party competition at the district level has been identified as a
variable that affects representational form; competitive systems have been found to have more responsiveness than noncompetitive systems. Second, election rule variables have been believed to have an impact on representational form. Examples of the latter include effective magnitude of the election system and the number of voters per district. In addition, the number of seats in an election system may have an effect on representational form.

Some scholars have suggested that the seats-votes relationship is heavily affected by the level of partisan competition that is found in electoral districts and the distribution of competition across districts (Tufte 1973; Garand, Parent and Teague 1991). This explanation is especially applicable to representational form. Assuming that all the districts in a given state can be placed on a dimension representing a particular party’s percent of the two-party vote in a given election, each district could range from 0% to 100%. Interparty competition would be highest in districts in which the two-party vote for the party was 50%. The further one moves from 50%, the more interparty competition would decrease.

When competition in the two-party vote is at its highest, the sensitivity of legislative seats to the popular vote should be high as well. In a state in which a large number of districts are competitive, a small shift in
partisan vote will cause a large number of districts (and thus, seats) to change hands from one party to the other. However, if many districts in a state are noncompetitive, even partisan shifts of relatively large magnitude could have little effect on seat change.

As an example, suppose that a state had only two election districts. In one district, the Democratic candidate won the previous election with 75% of the vote; in the second district, the Republican candidate won with the same vote percentage. In order for either party to control both seats in the state, there must be a vote swing of at least 25% toward one of the parties; a shift in the partisan vote toward either of the parties of only one percent would obviously result in a zero percent change in seats. If the same candidates had won with only 51% of the vote in the two districts, a one percent swing in the vote would provide a partisan sweep of the two seats. Clearly, in the latter case seat changes are more responsive to vote swings. Therefore, if one measured mean level of district competition by the mean district margin, such a measure should have a negative effect on representational form coefficients. If one were to create an index of mean district competition such that states with the most competitive districts possible were coded "1" and states with the least possible competitive districts were coded "0," then the index of competition would be positively related
to the representational form coefficient. In other words, if all districts were perfectly competitive in a given election, then any shifts in votes would result in massive seats shifts.

However, there are other characteristics of the popular vote distribution that will have an effect on the number of districts in the competitive range. These distributional characteristics should have an effect on representational form. As Garand, Parent, and Teague explain (1989, 11-12):

As long as there is some variation in [the party's] vote proportions across [districts], the distribution on [representational form] will have a nonzero variance, as well as a measurable skewness (i.e., measure of the symmetry or asymmetry of the distribution) and kurtosis (i.e., measure of the normality of the distribution, or the degree to which cases are distributed in the middle of the distribution or in its tails). Each of these 'moments' of the distribution should have a theoretical impact on the representational form of the [state's electoral system].

The dispersion of the distribution (measured by the standard deviation) is important when it is considered with the mean level of district competition. The standard deviation of the distribution should be negatively correlated with the representational form coefficient if mean vote is close to 50%. A low standard deviation implies that the distribution of the districts is close to the mean; therefore, a shift in party vote should have a dramatic effect on partisan seat changes. When the mean vote
is competitive but the party's vote proportions do not fit closely around a mean party vote of close to 50%, the result will be that only a few seats will actually change hands.

Alternatively, if the mean level of district competition is low (i.e., if the mean party vote deviates from 50%), the interaction between competition and the standard deviation will have a different relationship with representational form. This is to say that when competition is low, a high standard deviation means that some districts may fall in the competitive range and may experience seat changes. On the other hand, when the mean level of competition and the standard deviation are both low, then most districts will be uncompetitive and vote swings will not result in very many seat changes. The point is that the larger the number of seats in the competitive range, the larger will be the shift of seats given a relatively small shift in the partisan percentage of the vote; consequently, the higher will be the value for representational form.

The skewness of the vote distribution across districts should also affect representational form (Garand, Parent, and Teague 1989, 13). The relationship between skewness and party competition and between skewness and representational form depends on both the mean level of competition and the partisan direction of the party vote distribution. For example, in an electoral system in which there is no
competition one of the parties has an average district vote of 100%. In this case, there is no variation around the mean district average. As competition increases (i.e., as the losing party’s percentage of the vote approaches 50%), the value of the representational form coefficient should increase.

However, in a case in which the majority party receives, say, 75% of the average district vote, the effect of the skewness of the vote distribution on representational form depends on which party wins 75% and which party wins 25%. If it is the Republican Party that wins 75% of the average district vote, skewness will have a positive effect on the representational form coefficient only if it is in the direction of greater competition (in this example, negative skewness). If Republicans win only 25% of the mean district level vote (i.e., Democrats win 75%) then skewness will have a positive effect on the representational form coefficient only if the distribution of the proportion of the votes won by the Republican Party is positively skewed. Therefore, one must consider which party wins over 50% of the vote in specifying a relationship between skewness and representational form.

Assuming a constant mean and standard deviation, the kurtosis or normality of the distribution of district competition should be negatively related to representational form. "Positive kurtosis indicates that a higher
proportion of cases are found around the mean [of a distribu-
tion], while a negative kurtosis indicates that the cases
are more likely to be found in the tails of the distribu-
tion" (Garand, Parent, and Teague 1989, 14). However, the
relationship between kurtosis and representational form is
also dependent on the mean level of competition. If the
mean level of competition is high and kurtosis is high,
then a large number of districts are in the competitive
range and are likely to be affected by a partisan vote
swing. If the mean level of competition is low, a positive
kurtosis would indicate that most districts are uncompeti-
tive and that there will be a negative relationship between
kurtosis and the responsiveness parameter.¹

This is not to say that other variables will not have
an impact on the representational form coefficient. First,
the number of seats per electoral district (called district
magnitude at the district level and effective magnitude if
averaged over all districts in the election system) should
have an effect on the representational form coefficient
An extreme example can best illustrate this principle.
Imagine a situation in which there are two states: one
state has 100 seats contested in 100 single-member dis-
tricts, and the other state has 100 seats contested in one
huge multimember district. If the district winner rules
are proportional, then the latter state will probably have
a more proportional system *in the aggregate* since each party wins the same percentage of seats as votes. In the former state there will more than likely be a deviation from proportionality *in the aggregate* because the party that wins the most votes in a district will win the only district seat regardless of the exact percentage of the vote won in the district. The problem here is that "seats come in whole numbers while votes are a nearly continuous variable (Taagepera and Shugart 1989, 19)." Thus, there should be a negative relationship between effective magnitude and deviation from proportionality for systems in which seats are allocated by proportionality in the election districts (i.e., a negative relationship between effective magnitude and representational form).

Theoretically, however, if the district winner rules are plurality or majority in nature, one would expect that the relationship between seats per district and deviation from proportionality would be reversed. Using the same two states in the above example, a party winning 55% of the votes in the aggregate would likely lose in a number of district contests (i.e., win less than 50% of the vote in some districts) if the election system consisted of one hundred single-member districts. On the contrary, if the election system consisted of only one district, the party winning 55% of the votes would win all one hundred seats. In the plurality or majority winner rule system, then, the
state with the fewer seats per district would more likely produce more proportionality between seats and votes in the aggregate. U. S. state legislative elections do have variation in effective magnitude since most states have had multimember districts at some point in time over the past two decades. In addition, all states have used majority or plurality winner rules rather than proportional representation rules in allocating seats at the district level. Therefore, one should expect that there will be a positive relationship between effective magnitude and representational form in U. S. state legislative elections after controlling for district-level party competition (i.e., a positive relationship between effective magnitude and deviation from proportionality).

Incidentally, Jewell and Breaux (1991) have found that incumbents in southern state legislative multimember free-for-all districts tend to face opposition in primaries and in general elections more regularly than do incumbents who run in single-member districts. Similarly, in a multivariate analysis performed on 20 lower-house state legislatures, Weber, Tucker, and Brace (1991) find that multimember district elections tend to promote more marginal districts. Thus, aside from the effects noted previously concerning the translation of votes into seats in multimember plurality winner districts, multimember districts may promote more party competition and more
challenges to incumbents. Of course, however, it is the relationship between district magnitude and representational form rather than the relationship between district magnitude and party competition that will be tested in this analysis.

Second, Taagepera and Shugart (1989, 161-67) suggest that the number of voters per district will have an effect on the representational form of an election system. In general, the more voters per district, the less proportional the election system will be. Another example should suffice to explain this point. If there were only one voter per district, the election outcome would be perfectly proportional since each person's vote would translate directly into a seat. On the contrary, if there were 10,000 voters per district the chances are much greater that there would be wasted votes (votes cast for losing candidates) and that these wasted votes would not be exactly equal for each party. Therefore, in the latter case, the election system will more likely be majoritarian than proportional. By analyzing elections in four nations (New Zealand, the United Kingdom, the United States, and Canada), Taagepera and Shugart discover that the relationship between voters per district and representational form is closer when they measure the log of voters divided by the log of the number of electoral districts.
Third, and with all other things being equal, one might expect that the more seats found in an electoral system, the more seats will change hands given a particular vote shift. This hypothesis is simply a function of probability. In an election system in which there is only one seat, at some point on a seats-votes curve a one-unit shift in partisan vote will cause a change in partisan control of that seat. However, the odds are that the point at which a one-unit shift will cause the seat to swing will not be at the 50% point on the seats-votes curve. If another election system has 100 seats, it is more likely that a one-unit shift at the 50% point will cause at least one seat (if not more) to change hands. This hypothesis is posited tentatively, however, since the number of districts could conceivably affect the level of party competition at the district level. Of course, the demographic distribution of voters by election districts will be important. Nonetheless, holding other factors (including district party competition) constant, a system with a large number of seats should exhibit a higher representational form coefficient than a system with a smaller number of seats.

Finally, King (1989, 814-19) notices that responsiveness declines over the course of the 1970s regardless of the immediate impact of redistricting in six state legislatures. He speculates that this could be the result of a number of things, excepting redistricting: "incumbency,
partisan swing, demographic movements, [and] candidate decisions" (King 1989, 819). His findings also hold true for most of the 15 states in the Campagna and Grofman (1990) study. Thus, a trend toward more proportionality in the seats-votes relationship as a decade progresses should be expected. In addition, if the factors mentioned by King continue to have major impacts over time despite potential redistricting effects, one might observe a trend toward proportionality over a time series that is more lengthy than a decade. While a time counter should be included in this analysis, it may well be that inclusion of the above-mentioned variables will cause a trend variable to lose its statistical significance. Only after multiple regression is used to test the hypotheses will one be able to make definitive statements concerning the effects of the variables on representational form.

The literature suggests that party competition at the district level (which includes the effects of incumbency and other variables mentioned [but not tested] by King in the above paragraph), seats per district, and voters per district should have an impact on representational form. In addition, controlling for these variables, the number of seats in the electoral system may affect representational form. As is the case with representational form, explanations are also offered for the existence or lack of existence of partisan bias.
THEORETICAL EXPLANATIONS OF PARTISAN BIAS

It is also possible to suggest explanations for partisan bias. Perhaps the most likely reason for the existence of partisan bias is the deliberate drawing of district lines so as to benefit a particular party. During redistricting, it is possible that the party in control of the redistricting machinery will manipulate district boundaries to enhance the likelihood that the party will gain more seats in the legislature. Use of the redistricting machinery need not be excessively aggressive to benefit a particular party. An example from Taagepera and Shugart (1989, 17-18) illustrates how reasonable people (in this case, the two major parties in the U. S.) could disagree over the best way to reapportion election districts:

Consider the following situation, with eight equal-sized city quarters to be combined into four single-seat districts. The numbers shown are thousands of potential voters known to have Democratic and Republican preferences, respectively:

<table>
<thead>
<tr>
<th></th>
<th>Democratic</th>
<th>Republican</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-60</td>
<td>70-30</td>
<td>50-50</td>
</tr>
<tr>
<td>40-60</td>
<td>70-30</td>
<td>40-60</td>
</tr>
</tbody>
</table>

The total is an even 400:400, and one might expect each party to obtain two seats. However, if the Republicans can control the districting, they could join the areas vertically:

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>80-120</td>
<td>140-60</td>
<td>90-110</td>
<td>90-110</td>
<td></td>
</tr>
</tbody>
</table>

The Democrats would win overwhelmingly in the second district, but the Republicans would have a moderate but safe majority in the three others.
If the Democrats are in control of the districting, they would prefer to join the areas horizontally:

110-90 110-90
110-90 70-130

Now the Republicans waste votes in an overkill in the lower-right district, leaving the three other districts to the Democrats.

By sacrificing some votes in relatively safe districts to achieve marginal superiority in other districts or by placing as many voters as possible from the other party in a small number of districts, a party can possibly win more legislative seats in the subsequent election.\(^2\)

In fact, King (1989) finds that partisan redistricting results in partisan bias in 1972 in the election immediately following redistricting in two states. However, it is often the case that the effects of redistricting do not last more than one or two elections. Similarly, Basehart and Comer (1991) find short-lived redistricting effects in 15 single-member district lower house elections after the 1980 redistricting. Gryski, Reed, and Elliott (1990) find that partisan bias exists in the election systems of eight states in a time series from 1976 to 1984. Niemi and Jackman (1991) also find significant bias in their 47-state study in the 1970s. However, partisan bias virtually disappeared in the 1980-86 period. Campagna and Grofman identify substantial partisan bias in 13 single-member district states in individual elections from 1972 to 1986. While it is not always the case that partisan redistricting
results in bias for the party that controls redistricting, there is evidence that partisan bias exists in a number of states at various times over the past 20 years.

Interestingly enough, however, when states are competitive and both parties have relatively strong party organizations, redistricting often does not result in substantial bias. Niemi and Jackman (1990, 16) offer the following assessment of this tendency:

[In competitive states], it may be that parties exercised self-restraint because of concern over what would happen were they later to find themselves in a minority position. It may [also] be that because of the close competition in these states the majority was more closely monitored, more vigorously challenged in and out of court, and in other ways prevented from exercising its nominally complete control.

Another explanation may have more to do with legislative member goals rather than checks from the minority party. Legislators from the dominant party may be willing to maintain the status quo rather than face the uncertainty of election outcomes that results from increasing the seats the party may win by cutting into the party strongholds in the districts already held by party incumbents. "Dominant parties . . . appear willing to sacrifice some probability of a greater legislative majority for greater certainty of maintaining their current position" (Niemi and Jackman, 1990, 19).

Tufte posits that different levels of voter turnout for the parties may affect partisan bias. He notes that
"if, in the aggregate of all districts, low turnout or small districts are aligned with a particular party, there will be a bias in the seats-votes curve since that party is winning seats with relatively small numbers of votes (1973, 548)." He identifies the Democrats in the South as the prime example of a party that benefits from this type of bias. Because of low turnout in many districts and a relative lack of Republican opposition in the South, Democrats have won a large number of seats with a comparatively small number of votes.

Finally, as was mentioned in the preceding paragraph, Tufte believes that different population sizes of election districts will have an impact on partisan bias. Before Baker v. Carr (1962), overrepresentation granted rural districts in the South worked to the advantage of the Democrats. Bias emerged in the aggregate because unequal population sizes of districts meant that it took more Republican votes to guarantee a Republican legislative seat than was the case for Democrats. Tufte provides evidence that even in 1970 the smaller, but still present, inequities in population sizes of districts works to the advantage of Democrats in U. S. congressional elections (1973, 548-49). Nonetheless, due to the fact that the federal courts have become increasingly involved in scrutinizing reapportionment plans because of perceived malapportionment, the state elections held from 1968 to 1986 should
be much more free of this type of manipulation than elections held before 1968 (Baker 1986, 269).

In summary, there are a number of possible explanations for partisan bias. Gerrymandering, the drawing of district boundaries so as to benefit a particular party, is certainly a potential cause of partisan bias. Malapportionment, the drawing of districts such that population sizes are unequal across districts, could cause partisan bias. However, since Baker v. Carr (1962) and Reynolds v. Sims (1964), the threat of judicial involvement in reapportionment and the fact of judicial involvement in (particularly southern state) reapportionments has curtailed such inequities. Finally, if one were to use the total district votes for both parties as the operationalization of state partisan vote, it could be the case that turnout differences between voters from the two parties could affect partisan bias.

CONCLUSION

In this chapter, I have examined the theories underlying the two characteristics of electoral systems with which I am concerned. First, I defined the concept of representational form and discussed three classic patterns of representational form. I also provided an illustration of the seats-votes curves that are associated with these patterns of representational form. Second, I defined and illustrated the other characteristic of the seats-votes
relationship, partisan bias. Third, I noted several possible explanations of representational form. I discussed district party competition, effective magnitude, the number of voters per district, and the number of seats in an electoral district as variables that might affect representational form. Fourth, I put forward some hypotheses that might be used to explain partisan bias. Partisan gerrymandering, differences in turnout between voters who are members of the two major parties, and differences in district population sizes (if one party is affected more than the other party) could have an impact on partisan bias in an election system.

In the next chapter, I describe the data and the techniques I use to test my hypotheses. I explain the procedure for calculating representational form and partisan bias. Next, I describe the operationalizations of the concepts used in Chapter Three and the models used to test variation in representational form and partisan bias, respectively. Finally, I discuss the problems I encountered in my research and how those problems were solved.
NOTES

1. While it might appear at first glance that a discrete measure of the percent of districts in the competitive range might provide a good indicator for the distributional characteristics cited above, there are two reasons why such a measure is eschewed. First, how does one identify a competitive district? Two problems are present here. Initially, the problem with such an indicator is that it is difficult to identify the exact percentage of the vote (or, in this case, district margin) by which one can say that one district is competitive but the next district with a 1% larger margin of victory is not competitive. Identifying the "competitive" district becomes arbitrary. In addition, the process is further complicated by the possibility that competitiveness varies over time. Previous research on the U. S. Congress suggests that any "objective" measure (such as 55% or 60%) of marginality of an election district is subject to change over time (Garand and Gross 1984; Gross and Garand 1984; Jacobson 1987; Bauer and Hibbing 1989; Garand, Wink, and Vincent 1989). That is to say that incumbents who win by a slim margin in 1980 are defeated less often in the next election (are "safer") than an incumbent who won by a slim margin in 1950. Thus, a competitive district identified by a certain percentage of the vote in 1968 may not be considered competitive in 1986. Second, and most importantly, one loses information when one simply categorizes districts as competitive or uncompetitive. By charting out the results from all election districts and measuring the effects of competition, standard deviation of competition, skewness of competition, and kurtosis of competition on seat allocation, one gets a more precise picture of exactly what is happening at the district level.

2. For another good explanation of the techniques a party can use during redistricting to enhance its probability of winning more seats, see Dresang and Gosling 1984, 100-102.

3. As noted by Campbell (1991, 3-4), findings concerning the effect of voter turnout on partisan bias may hinge on how one operationalizes partisan votes. Tuft's operationalization of partisan votes as actual votes rather than as aggregated district vote percentages allows him to test the effects of turnout on partisan bias in U. S. House elections. However, U. S. House elections are all single-member district contests and there are fewer uncontested elections here than in U. S. state legislative elections. In U. S. state legislative elections, the existence of floterial districts (districts composed of a number of smaller single-member districts) and a relatively large
number of uncontested elections calls into question the relevance of using total district votes as opposed to average district votes. For an example of the uncontested election problem, in a state (such as Arkansas) where Democrats may win 50% of their seats uncontested a Democratic "bias" may emerge if one examines total statewide partisan vote. This Democratic bias may simply be a result of the fact that Democratic turnout will be low in those districts in which a Democrat runs uncontested. Another practical reason for choosing to measure partisan votes by district averages is because four states (Arkansas, Florida, Kentucky, and Oklahoma) do not report district election results in uncontested elections for a number of election years.
CHAPTER FOUR: DATA AND METHODS

The last chapter was devoted to the theory underlying the concepts of representational form and partisan bias. In this chapter, discussion will revolve around the empirical definitions (i.e., the measurement) of representational form and partisan bias. Additionally, I will describe the models that I use to test the hypotheses presented in Chapter Three.

In this chapter, I first describe the data I use in this study. In the second section of the chapter, I go into detail about the steps I have taken to manipulate the data in such a way as to answer the questions posed in the preceding chapter. Third, I describe the model I used to explain variation in representational form. In the fourth section, I present my model for explaining variation in partisan bias. In the fifth part of the chapter, I discuss special problems presented by my study and the techniques I used to solve these problems. In this fifth section, I touch upon the problems of uncontested elections, multi-member districts, and third-party candidacies.

THE DATA

The data that are employed here are the district-level data on state legislative elections that have recently been collected and coded in machine readable format by the Interuniversity Consortium for Political and Social
Research (ICPSR). The data extend from 1968 to 1986 and include elections from 49 states for both legislative houses. Data are unavailable for Vermont for the entire time series and for North Carolina for the elections of 1968 and 1986.

These district-level data permit one to study all the state legislative elections for 48 states with relative ease. The district-level nature of the data and the length of the time series also allow one to include four states that are excluded by Gryski, Reed, and Elliot (1990) because the representatives of these states served four-year terms. Because they can be used to provide interpretable coefficients for individual elections, the district-level data may also provide the opportunity to include calculations from Georgia, a state that has often been excluded because of its "blend of district and county at-large elections" (Gryski, Reed, and Elliot 1990, 146). Finally, these data will facilitate the measurement of representation and partisan bias for each state over the entire time series and for individual elections.

THE RESEARCH DESIGN

Estimation of Partisan Bias and Representational Form Parameters

As noted above, I employ district-level data for individual state legislative elections. However, to measure seats-votes relationships, aggregate data must be
employed. The historical method of measuring seat-votes relationships involves the use of aggregate election returns for partisan seats and votes for a number of elections. If one uses this approach and plots the data, each point on the seats-votes graph identifies a particular party's seats and votes for one specific election. Using these points for a number of elections over time, regression analysis is employed to fit a seats-votes curve.

The other approach to measuring seats-votes relationships, and the one used in this dissertation, is the uniform partisan swing method. This technique has been accepted in the literature as one of the best ways of estimating bias and representational form. It is also the choice of many of those who have done current research in this area (Campagna 1991; Campagna and Grofman 1990a; Campagna and Grofman 1990b; Garand and Parent 1991; Gelman and King 1990; King 1989).

Just as with the historical approach, the uniform partisan swing method generates a number of data points in order to draw a regression line to measure the fit of the data points to the seats-votes curve. Unlike the historical approach, however, the uniform partisan swing approach uses actual aggregate election results from only one election. The other data points are hypothetical election results generated through simulations based on the uniform partisan swing method.
How are hypothetical election results obtained using the uniform partisan swing approach? One begins with the actual partisan district vote percentages or average partisan district vote percentages and the partisan seat totals or percentages for each election. For each election, one creates a number of hypothetical vote and seat proportions by adding and subtracting increments of one percent from the actual vote percentages. As the partisan vote percentages change across all districts at one percent increments, party control of a certain number of seats will change. These new "hypothetical" election results serve as the data points in the regression model of the uniform partisan swing approach.

Perhaps an example from the Iowa state lower house election of 1968 will better illustrate exactly how this method works. Table 4.1 shows actual election results and hypothetical election results that are generated by adding and subtracting, respectively, one percent and two percent of the mean district Republican vote from the actual district mean Republican vote. Columns 1 and 2 provide actual election results for Republican candidates in 10 state representative districts in Iowa in 1968. Here, Republicans win 53.6% of the average district vote and 50% of the seats. The uniform partisan swing technique will generate Republican percentages of seats won at 54.6%, 55.6%, 56.6%, . . . . 100% of the vote.
### Table 4.1. Uniform Partisan Swing Approach Applied to Republican Candidates in Iowa State House of Representatives Districts, 1960

<table>
<thead>
<tr>
<th>Rep. Vote</th>
<th>+1% vote</th>
<th>+2% vote</th>
<th>-1% vote</th>
<th>-2% vote</th>
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<tr>
<td></td>
<td>Seat%</td>
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<tr>
<td>.617</td>
<td>1.00</td>
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<td>1.00</td>
<td>.637</td>
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<td>.657</td>
<td>1.00</td>
<td>.667</td>
<td>1.00</td>
<td>.677</td>
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<td>.715</td>
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<td>.725</td>
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<td>.545</td>
<td>1.00</td>
<td>.555</td>
<td>1.00</td>
<td>.565</td>
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<td>.391</td>
<td>0.00</td>
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<td>.411</td>
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<td>.531</td>
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<td>.498</td>
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<td>.462</td>
<td>0.00</td>
<td>.472</td>
<td>0.00</td>
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<td>.463</td>
<td>0.00</td>
<td>.473</td>
<td>0.00</td>
<td>.483</td>
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#### Mean District Republican Vote % and Aggregate Republican Seat %

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</tr>
</thead>
<tbody>
<tr>
<td>.536</td>
<td>0.50</td>
<td>.546</td>
<td>0.70</td>
<td>.556</td>
<td>0.70</td>
<td>.526</td>
<td>0.50</td>
<td>.516</td>
</tr>
</tbody>
</table>
Likewise, one can determine how many seats Republicans would win if the uniform swing was in the other direction: 52.6%, 51.6%, . . . 0%. As Table 4.1 illustrates, at 54.6% of the vote Republicans win 70% of the seats (Columns 3 and 4). At 55.6% of the vote, Republicans still win 70% of the seats in these districts (Columns 5 and 6). Alternatively, as the Republican mean district vote declines to 52.6%, Republicans seat percentages decline to 50% (Columns 7 and 8). An additional one percent decline in mean Republican district vote to 51.6% results in another seat loss; thus, Republicans win only 40% of the seats at this point (Columns 9 and 10). Each of these hypothetical results are treated as actual election results for purposes of charting the seats-votes curve for the 1968 Iowa election.

In particular, this technique is clearly superior to the historical approach for measuring partisan bias and representational form for an individual election. One does not have to make a decision about which election years to include or exclude and the immediate effects of redistricting can be analyzed best using uniform partisan swing. This approach also presents the benefit of estimating seats-votes curves using hypothetical election results that are not bound by historical results. Finally, the use of a large number of data points helps insure the stability of the estimates and gives the researcher confidence in the accuracy of the findings. As is illustrated by the example
from the Iowa election, hypothetical results can be calculated across the entire spectrum of partisan vote possibilities (i.e., from 0% to 100% of the mean district Republican vote) or from a smaller subset of points. In this dissertation, seats-votes curves are calculated from 35% to 65% of mean district Republican vote. Thus, the regression equation in which partisan bias and representational form are estimated utilizes 31 data points. If actual election results had been used in this project, only 10 data points (elections every two years from 1968 to 1986) could be used for most states (Gryski, Reed, and Elliot 1990).

The model that is utilized to measure partisan bias and representation in the present study is the logit model that has been used to study state legislatures (Browning and King 1987; Campagna 1991; Campagna and Grofman 1990a; Gryski, Reed, and Elliott 1990; Niemi and Jackman 1991), the electoral college (Garand and Parent 1991), presidential primaries (Ansolabehere and King 1991; Geer 1986) and Congress (Campagna and Grofman 1990b; King 1990; King and Browning 1987; Tufte 1973):

$$\log_2 \left( \frac{S}{1 - S} \right) = \log a_1 + b \log_2 \left( \frac{V}{1 - V} \right), \quad (4.1)$$

where the variables are defined as in Equation 3.1. King and Browning (1987, 1256) stress the reason why a logit model is superior to Tufte's original attempt to produce an equation that contains both parameters:
[Tufte's equation] was a linear approximation of \((S / 1 - S) = (V / 1 - V)\). We believe [a] non-linear model is a more realistic version than Tufte's in that [it allows] for every possible degree of partisan bias and every possible form of democratic representation. Unlike the linear model, even systems with widely varying and quite extreme values of \(S\) and \(V\) can be incorporated in this model . . . . [It is] a more realistic model of both bias and representation [because it allows] for the exact form of the bias to depend upon the specific type of electoral representation.

This quotation highlights two important advantages of using a logit model rather than a linear model to measure the representational form and partisan bias parameters. First, not all seats-votes relationships take on a linear pattern (Garand and Parent 1991; King and Browning 1987; Tufte 1973). From the point of view of previous empirical findings, then, it is necessary to use a logit equation to find the most accurate values for representational form and partisan bias in cases in which the seats-votes relationship is not linear.

Second, the logit equation allows the researcher to specify all possible relationships between seats and votes. In other words, whereas the linear equation assumes that the seats-votes relationship is linear, with the logit equation both linear and nonlinear patterns can be identified. In fact, the logit equation allows the researcher to identify the entire range of values for both partisan bias and representational form, while the linear equation specifies that the representational form parameter is one.
The bias parameter will indicate, in a relative sense, which states have systems that benefit one of the two parties and which states have systems that provide both parties with nearly equal seat totals at a particular percentage of the vote won. The representational form parameter illustrates the general functional relationship between seats and votes. The representational form parameter will range from 0 to infinity, with 1.0 equating to proportional representation, a figure between 1.0 and infinity approximating majoritarian representation, and \[ \alpha \] representing a winner-take-all system.¹

The Use of Pooled Data

In this analysis, I use pooled data. Comparative data on U. S. states can be analyzed in a number of ways. Typically, researchers using state data use either a cross-sectional research design or a time-series research design. The cross-sectional research design involves data collected for all or most of the states from only one time period. The researcher using such a design is concerned with identifying the relationship among independent and dependent variables for the states at one point in time.

The time-series analysis research design involves analysis of only one state over time. Researchers employing a time-series analysis are concerned with the effects of independent variables on a dependent variable over time. Comparisons between or among states are not the
focus of this type of analysis; rather, the researcher desires to know how dependent and independent variables collected in a single state covary from one time period to another.

A third type of research design, the pooled cross-sectional time-series analysis, employs elements of the other two research designs and thereby avoids the pitfalls of using only one or the other. The major criticism of cross-sectional research designs is that they are static and therefore unable to model processes. One can only use such a design to make generalizations about phenomena at one point in time. Two criticisms of the time-series analysis are: (a) generalizations can be offered only for the state used in the design; (b) some variables may not change over time and cannot, therefore, be included in such a design.

The pooled cross-sectional time-series analysis includes data from a number of states at a number of points of time. This research design allows one to make generalizations both across states and across time. Thus, the pooled cross-sectional time-series analysis contains the advantages of the other two approaches while avoiding the disadvantages. Essentially, one takes advantage of all of the covariation among dependent and independent variables. In addition, a pooled data set using the same number of states as a cross-sectional analysis and the same number of
years as a time-series analysis includes many more cases than will either of the other two types of designs. This latter advantage should lead to more stable estimates and should strengthen the researcher's ability to engage in hypothesis testing (Holbrook 1991, 93-94, Sayrs 1989, 7-14).

PLAN OF THE ANALYSIS

The analysis conducted for this dissertation requires four steps, some of which will be explained in greater detail in a later section of this chapter. First, the data for each state are printed out and recoded so that partisan vote variables can be created. This first step is necessary because the data were coded originally such that individual candidates served as the cases. For example, in Iowa in 1968, one line of data is devoted to Republican candidate Dennis L. Freeman. The next line of data pertains to the Republican candidate from the next district, Charles E. Grassley. However, since Grassley ran uncontested and there was no third party candidate in Freeman's district, a line for the Democratic Party candidate and a third party candidate must be added to Grassley's district and a third party line must be added to Freeman's districts. Only in this way can party votes in these districts be properly registered. Each district contains three lines of information: The first line contains information on Democratic candidates, the second line pertains
to candidates from the Republican Party, and the third line is devoted to third party candidacies. Each electoral district, then, becomes the case.

In addition, multimember districts are recoded as quasi single-member districts in the first step. The highest vote winners from the Democratic Party are paired with the lowest vote winners from the Republican Party, and so on. Next, the third-party candidate acquiring the most votes is placed in the district containing the major party candidate who outpaced his or her major party opposition but won the fewest votes in doing so. The procedure involving the third-party candidate ensures that the third-party candidate who actually wins a seat is placed in a district such that his vote total is the largest of the three candidates in the quasi single-member district. At this juncture it is also necessary to convert raw vote totals to percentages of the two-party vote.²

After the average partisan district vote and seats won by both parties are calculated, it is possible to begin the second step in the process. This is the step in which the uniform partisan swing is applied to the actual election results. As noted in the reference to the 1968 Iowa election in Table 4.1, the average partisan district vote is manipulated by increments of one percent and the changing seat totals that correspond to the respective one percent shifts are noted. In this way, one can create up to 100
hypothesized elections results that are generated for each individual election year.

At this stage, however, I have decided to truncate the data so that only the mean Republican votes in the 35% to 65% range are included in the calculation of the seats-votes curves. Truncating the data limits the number of districts in which it is actually impossible to add or to subtract an incremental percentage of the Republican vote. For example, at the point in which Republicans win 80% of the mean district vote there may be many districts in which Republicans have already won 100% of the vote. Adding additional percentages of Republican votes to all districts would push Republican vote percentages over 100%. While it might be possible to reallocate Republican vote percentages to districts in which Republican candidates have not won 100% of the votes, such an undertaking would be difficult and time consuming. The most frequently used method is to limit the data points to some figures close to the 50% point (usually 40% to 60%). Utilizing the points from 35% to 65% minimizes the problem of allocating votes to Republicans who have already won 100% of the district vote and at the same time allows one to use more of the data from the hypothetical elections than one would use if the 40% to 60% range were chosen.

The third step is the calculation of the partisan bias and representation coefficients using the logit equation
described previously. For each state, one partisan bias coefficient and one representational form coefficient are produced in each election year. As noted above, these coefficients are estimated by applying the seats-votes model in Equation 4.1 to the hypothetical data derived from the uniform partisan swing method rather than from historical seats-votes data.

The fourth and final step is the estimation of the models used to explain variations in representational form and partisan bias. The dependent variables in each of these models are the coefficients produced in the third step of the procedure. The specification of the models will be explained in a later section of the present chapter.

ESTIMATING MODELS EXPLAINING VARIATION IN PARTISAN BIAS AND REPRESENTATIONAL FORM

A Model of Representational Form

The electoral college study of Garand, Parent, and Teague (1989) provides evidence that the mean level of party competition in the states has a strong, positive effect on the representational form of the electoral college in presidential elections; that is, the electoral college is more responsive to shifts in voting as party competition increases in the states. The study highlights the effects of a number of aspects of the distribution of partisan votes on representational form. These aspects of
partisan vote distribution include standard deviation, skewness, and kurtosis. The interaction of these distributional characteristics and the mean level of party competition and their effect on representational form will be described below.

Garand, Parent, and Teague (1989) illustrate that when the mean level of competition is zero, the magnitude of the standard deviation (or measure of dispersion) of the mean vote of the Republican party is positively related to representational form. This occurs because when competition is zero, that is, when the districts as a whole are very uncompetitive, a high standard deviation implies that some districts will have party competition that deviates from the mean and are therefore competitive. Thus, a change in votes should cause some of these competitive districts to change party hands.

However, specification of an interaction term between competition and the standard deviation of the Republican Party's votes across the states shows that, as competition increases, the effect of the standard deviation on representational form is strongly negative (i.e., the system is far less responsive). This is the case because as competition increases, a large standard deviation illustrates that there are a number of districts that deviate substantially from the mean level of competition and are thus uncompetitive. Likewise, in the present study, it is expected that
the mean level of district competition and the standard deviation of party vote percentages will have a positive effect on the representational form of the state electoral system. It is also hypothesized that the interaction of mean district competition and the standard deviation of party vote percentages will have a negative impact on the state's representational form. Quite simply, the higher the level of party competition is across the districts, the larger will be the value of the representational form for the state (Garand, Parent, and Teague 1989, 14, Table 2).

The electoral college study also highlights the importance of skewness (the "heaviness" of a distribution toward high or low values). As noted in Chapter Three, the relationship between skewness and representational form is dependent on which party wins most of the vote in the election as well as the level of party competition in the state. In general, as party competition rises, the interaction between state competition and positive skewness (skewness toward the lower value, or heavy left tail skewness) of a party's district vote percentage should have a positive effect on representational form if one party wins more than 50% of the vote and a negative effect on representational form if the other party wins 50% of the vote (and the opposite is true if negative skewness, skewness toward the higher value of party vote, is used). The point is that a new variable must be created with values of plus
one and negative one and multiplied with the skewness variable to control for the partisan direction of the relationship. Only in this way will there be consistency in the findings for skewness.

In the electoral college study, Garand, Parent, and Teague also suggest that the kurtosis of a party’s state vote will affect representational form. Kurtosis measures "the normality of a distribution (Garand, Parent, and Teague 1989, 10)." Positive kurtosis (illustrating that more cases are found near the mean as opposed to the tails of the distribution) of Republican party vote distribution is negatively related to representational form when the mean level of competition is zero. However, as the mean level of competition takes on larger positive values, the interaction between mean level of competition and kurtosis has a positive impact on representational form (Garand, Parent, and Teague 1989, 14, Table 2). Even though the findings for kurtosis were only significant at the .10 level using a one-tailed test in the Garand, Parent, and Teague study, the representational form model will include kurtosis of partisan district-level vote as an independent variable.

The effective magnitude of the state should have a positive effect on representational form. As noted in Chapter Three, this should be the case because the U. S. states have plurality winner rules. Since seats can only
be partitioned in whole numbers, a state with more than one seat per district would be more likely to produce election results that were not proportional than would a state that had only one seat per district. This should particularly apply once one controls for the district partisan vote variables.

In addition, Taagepera's index should have a positive impact on representational form. This variable is usually specified as the log of voters divided by the log of the number of electoral districts. The more voters there are in a particular district, the less likely is the possibility that there will be a proportional relationship between seats and votes. Alternatively, and admittedly at the opposite extreme, if all districts contained only one voter, there would be a perfectly proportional system since a party's vote percentage would exactly equal that party's seat percentage. The larger the election district, the more unlikely it would be that election outcomes in majority or plurality winner districts could produce a proportional relationship between partisan seats and votes in the aggregate.

It may also be the case that the more seats there are to win, the more seats will change hands given a particular vote. This assumes that the effects of other variables are held constant. Because there are single-member seat districts and multimember-seat districts in this election
series, it might be useful to differentiate between seats and districts in determining whether there is an effect on representational form. Thus, in addition to including a variable for the number of seats, it might be useful to include a variable on the number of districts. Care will be taken to test for collinearity between the "number of districts" variable and other independent variables; should collinearity be a problem, a more parsimonious model of representational form will be specified.

Since it has been observed that representational form has been declining in congressional elections and may be declining for state legislative elections as well, a trend or counter variable will be included in the model. Of course, a trend variable is not a causal variable in and of itself. However, should the model be misspecified, it may be useful to discover if there is a trend in representational form to help in selecting variables for future research.

The representational form model will be specified as:

\[ RFORM = a_1 + b_1 MCOMP + b_2 (MCOMP)*(STANDEV) \]
\[ + b_3 (MCOMP)*(SKEW)*(CONTROL) + b_4 (MCOMP)*(KURT) \]
\[ + b_5 MAG + b_6 TAAG + b_7 NSEATS + b_8 NDIST \]
\[ + b_9 COUNTER + e \]

The dependent variable, RFORM, is the representational form coefficient that is generated from the logit model of the seats-votes ratio that was discussed in a previous
section of the paper. RFORM can vary theoretically from 0.00 to infinity, with 1.00 indicating a proportional system and larger numbers a system more responsive to vote shifts in the competitive or middle range of the vote distribution (i.e., majoritarian between 1.0 and infinity and winner-take-all at infinity). MCOMP is an index measuring the mean level of district competition. MCOMP ranges from 0 (meaning that there is a low level of district competition in the state) to 1 (meaning that there is a high degree of competition). As the level of competition increases, it is hypothesized that the electoral system will become more sensitive to vote shifts; thus, the representational form coefficient will increase. The $b_1$ coefficient, therefore, is expected to be positive.

STANDEV is the standard deviation of the Republican percentage of the vote across districts. The interaction variable $\text{(MCOMP)}^*\text{(STANDEV)}$ represents a situation in which the mean level of competition is rising at the same time the standard deviation of mean Republican district-level vote is rising. In this case, a high standard deviation indicates that some districts deviate from the high mean level of competition. Thus, the $b_2$ coefficient is expected to be negatively correlated with representational form.

SKEW is the skewness of the distribution of Republican vote percentages in the state's districts. The variable $\text{(MCOMP)}^*\text{(SKEW)}$ represents the interaction between skewness
and a rising level of district competition. As noted earlier in both Chapter Three and this chapter, however, one must specify which party is winning more than 50% of the vote in order for the impact of the interaction between skewness of Republican district vote and party competition on representational form to be consistent. If one used skewness of Democratic district vote percentages, the relationship between \((MCOMP)^* (SKEW)\) would be reversed. A dummy variable must be created to control for this relationship. This dummy variable is named CONTROL. The complete interaction variable, therefore, becomes \((CONTROL)^* (MCOMP)^* (SKEW)\). Since skewness of Republican vote is used in this analysis, it makes sense to code CONTROL as plus one if the mean Republican vote exceeds mean Democratic vote in a state and negative one if the opposite is the case. In this way, one can assure the \(b_3\) coefficient will be in the correct direction regardless of which party wins the most votes. It is expected that \(b_3\) will be positive.

KURT is the kurtosis of Republican district vote percentages. Kurtosis measures the degree to which observations or cases in a distribution are found close to the mean or at the tails given a particular standard deviation. Positive kurtosis is found in situations in which more cases are distributed close to the mean; thus, negative kurtosis refers to a distribution with a high percentage of
cases in the tails. The variable \((\text{MCOMP})\times(\text{KURT})\) is the interaction of partisan competition and the kurtosis of Republican district vote percentages. An increase in competition with a positive kurtosis means that more districts are in the competitive range and that the representational form variable will be large. When competition is high and kurtosis is low, districts will mostly fall into the less competitive range and the representational form value will decline accordingly. Therefore, the coefficient for the interaction of competition and kurtosis, \(b_4\), is expected to be positive.

MAG is effective magnitude (the number of state seats per district). Because the U. S. states have plurality or majority winner rules in state legislative districts, it is believed that the more seats there are for each legislative district the more the state's electoral system will be responsive to partisan vote shifts. Controlling for the other variables in the study, one should expect that proportionality would be enhanced if there were only single-member districts rather than the multimember districts found in many state legislative elections. Effective magnitude, in other words, should correlate positively with representational form (Rae 1967 19, 114-25; Taagepera and Shugart 1989, 112-25). Thus, it is expected that \(b_5\) should be positive.
TAAG is the \( \frac{\text{Log Votes}}{\text{Log Districts}} \) variable suggested by Taagepera. When this variable is positive, this indicates that the election districts are fairly large in terms of population. In a plurality system like that of the United States, when there are a great number of people per district the election system should deviate from proportionality. Because of votes wasted on district losers, this variable should be positively correlated with representational form. Thus, \( b_2 \) should be positive.

NSEATS is the number of seats in the legislature and NDIST is the number of districts in a state election system. Controlling for other variables, one might expect both of these to contribute to a rise in representational form because of the greater likelihood that at least some seats or districts in a state will change party hands the more seats or districts there are to contest. However, since NSEATS and NDIST are the same in single-member district election states, one should be careful in specifying a model with both of these variables. In addition, it may be that Taagepera's index taps into the same process as the NDIST variable. The hypotheses are that both \( b_1 \) and \( b_2 \) will be positive, but checks for multicollinearity may result in the need to exclude one or more of these two variables from the model.

Finally, a COUNTER variable measuring time is included in the model. The values for this variable are constructed
by subtracting 1968, the first year in the time series, from every other year in the time series. Thus, 1968 elections are coded 0, 1969 elections are coded 1, etc., up to the handful of 1987 elections that are coded 19. Since previous research on legislative elections suggests that swing ratios are definitely declining in congressional elections and may be declining in state legislative elections, it is believed that the trend will be in the direction of lower representational form values. Thus, \( b_2 \) is expected to be negative.

A Model of Partisan Bias

In the present study, the emphasis in explaining partisan bias is placed on redistricting. That is to say, it is expected that gerrymandering will be the cause of partisan bias in U. S. state legislative elections. Therefore, the model of partisan bias will be specified as:

\[
RBIAS = a_1 + b_1 (PART) \times (REDIST) \tag{4.3}
\]

In this model, \( RBIAS \) is the natural log of partisan bias toward the Republicans exhibited by the election system. This variable is the constant generated in the equation:

\[
\ln \left( \frac{s}{1 - s} \right) = \ln a + b \ln \left( \frac{v}{1 - v} \right) + e \tag{4.4}
\]

In most cases it is expected that \( RBIAS \) will vary from 1.00 to -1.00. If no bias exists, then this coefficient will equal 0. A system biased toward the Republicans will
be represented by a positive number, while negative numbers indicate bias toward the Democrats. Only in cases of extremely large degrees of bias should \( R\text{BIAS} \) be greater than 1.0 or less than -1.0.

\( \text{PART} \) is a variable that accounts for partisan control of redistricting as formulated by King (1989). In general, \( \text{PART} \) is coded 1 if Republicans control the redistricting machinery, 0 if the redistricting is performed by a bipartisan or nonpartisan commission, the courts (assuming the courts are not stacked in favor of a particular party), or if evidence indicates that a bipartisan plan was passed by the legislature, and -1 if the Democrats control redistricting. A party is assumed to be able to control redistricting in cases in which the party controls enough of the redistricting machinery (at least a majority of the three branches of government -- the two houses of the legislature and the governorship) and there is evidence that an attempt was made to gerrymander. King (1989) has coded redistrictings as being controlled by a party if allegations of partisan bias were raised and these allegations appeared to be justified. King accumulated the data for his coding scheme from records of the redistricting process given in state "Blue Books" that were provided by the state governments. Since the evidence indicates that partisan control of redistricting is more apt to result in bias than is a nonpartisan or bipartisan plan, this variable should have a
positive effect on the dependent variable. In other words, for example, Republican bias should be more likely to occur when the redistricting is controlled by the state Republican Party (Campagna and Grofman 1991; King 1989; Niemi and Jackman 1991).

Party control of redistricting is hypothesized to have an effect on all the elections succeeding redistricting. A dummy variable, REDIST, is created to identify each election year in which a redistricting occurred. This variable is created for each year and coded one if there was a redistricting and zero otherwise. When PART is multiplied by REDIST, the interaction term, INTER, measures the effect of each redistricting on elections that follow redistricting. Each independent variable in the bias model is coded with a suffix to differentiate it from the other variables with the same name (e.g., 1970 election year variables contain the suffix "70"). Therefore, $b_i$ in Equation 4.3 should be positive.3

It is expected that bias will decrease over time as legislatures become more hesitant to produce plans that are obviously biased. This could be expected from the threat of intervention by the courts. It should also be noted that as redistricting becomes more sophisticated and incumbent legislators are better able through the use of technology to foresee the results of their actions, they may opt to protect themselves via a "bipartisan" or
"sweetheart" gerrymander rather than attempt to maximize partisan seat gains by weakening existing incumbents. It may be expected, then, that even when one party controls all the relevant machinery of government that highly partisan redistrictings are less likely to occur in the latter years of the time series. Since it may be believed that bias is decreasing over time, the hypothesis is that the absolute value of $b_2$, the coefficient associated with the yearly dummy variables, will decline over time. Table 4.2 contains a summary of the definitions of the variables used in the representational form model. Table 4.3 provides a summary of the independent variables in the partisan bias model.

**ESTIMATION USING A POOLED MODEL**

One can often employ ordinary least squares (OLS) regression to test hypotheses using pooled models. However, there are potential problems posed by the use of pooled data. One problem is autocorrelation and the other problem is heteroscedasticity.

Autocorrelation occurs in OLS when "individual disturbance terms are not independent but instead are related to each other in a systematic fashion (Ostrom 1990, 8)." This is a danger in time-series analysis; since pooling contains elements of time-series analyses, it is also a danger in using pooled data. If positive autocorrelation exists (the
<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCOMP</td>
<td>Mean level of district party competition: Continuous variable ranging from 0 (no party competition to 1 (perfect party competition)</td>
</tr>
<tr>
<td>(MCOMP) * (STANDEV)</td>
<td>Interaction term created by multiplying mean level of district party competition with standard deviation of distribution of Repub. district vote %</td>
</tr>
<tr>
<td>(MCOMP) * (SKEW) * (CONTROL)</td>
<td>Interaction term created by multiplying mean level of district party competition with skewness of distribution of Repub. district vote % and with dummy variable coded 1 if Repubs. win higher % of district votes in state than Dems. and coded -1 if the opposite occurs</td>
</tr>
<tr>
<td>(MCOMP) * (KURT)</td>
<td>Interaction term created by multiplying mean level of district competition with kurtosis of distribution of Repub. district vote %</td>
</tr>
<tr>
<td>MAG</td>
<td>Effective Magnitude: Number of seats in state divided by number of legislative districts</td>
</tr>
<tr>
<td>TAAG</td>
<td>Taagepera’s Index: Log of number of voters divided by log of number of legislative districts</td>
</tr>
<tr>
<td>NSEATS</td>
<td>Number of legislative seats</td>
</tr>
<tr>
<td>NDIST</td>
<td>Number of legislative districts</td>
</tr>
<tr>
<td>COUNTER</td>
<td>Number of years minus 1968, ranging from 1 (1969) to 19 (1987)</td>
</tr>
</tbody>
</table>
## TABLE 4.3. Description of Independent Variables for Model of Partisan Bias

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(REDIST) * (PART) = INTER</td>
<td>Interaction term created by multiplying dummy variable coded 1 for elections immediately following redistricting and 0 otherwise with dummy variable coded 1 if Repubs. controlled redistricting and attempted to gerrymander, 0 if there was no evidence of gerrymandering, and -1 if Dems. controlled redistricting and attempted to gerrymander</td>
</tr>
<tr>
<td>COUNTER</td>
<td>Number of years minus 1968, ranging from 1 (1969) to 19 (1987)</td>
</tr>
</tbody>
</table>
most common type of autocorrelation), hypothesis testing is more difficult because the error variance is underestimated. The practical consequence of this problem is that the fit of the regression line to the data is more accurate than it should be; thus, estimated coefficients are artificially reliable even if they should really be unreliable. Coefficients used to test hypotheses appear to be significant even when they may not be. In the case of negative autocorrelation, coefficients that are in actuality statistically significant appear to be insignificant (Ostrom 1990, 16-26).

The Durbin-Watson statistic provides insight into whether the error terms of the regression equations are, in fact, correlated over time, or are randomly distributed around the regression line. The formula for this statistic is:

\[ d = \frac{\sum (e_t - e_{t-1})^2}{\sum e_t^2} \]

(4.5)

where the \( e_t \)s are the OLS regression residuals (Ostrom 1990, 27). Positive autocorrelation produces small values for \( d \) and negative autocorrelation results in large values for \( d \). One can use the Durbin-Watson statistic to test for the existence of first-order autocorrelation in the OLS regression estimates. While the results of the test for autocorrelation depend on the number of independent variables and the sample size, generally speaking, the further the Durbin-Watson statistic deviates from a value of 2.0,
the higher the probability that autocorrelation is present (See Ostrom 1990, 28-29).

Should autocorrelation become a problem in this dissertation, I will employ the two-step Prais-Winsten technique to estimate the models. This is an estimated generalized least squares (EGLS) technique offered in the SAS statistical software package. This technique allows the researcher to obtain OLS estimates of the independent variable parameters and the residuals, to determine the effects of the autocorrelated residuals, and to use OLS to reestimate the parameters of the independent variables while subtracting from both sides of the transformed equation the value of the coefficient associated with the residuals (Ostrom 1990, 34-35). The two-step Prais-Winsten application thus allows a more realistic estimate of the effect of the independent variables on the dependent variable. In this study, therefore, GLS regression results will always be reported when autocorrelation is found to be in existence.

The second potential problem is the possibility of heteroscedasticity. Heteroscedasticity is a problem that may occur in cross-sectional research designs as well as pooled research designs. In reference to a pooled research design, heteroscedasticity occurs when "the error term contains an unobserved variable that is constant within cross-sectional units but variable between cross-sectional
units. In other words, each cross-sectional unit has its own peculiar intercept (Holbrook 1991, 101)." One way to test for this problem is to employ a dummy variable least squares (DVLS) model. The researcher simply adds dummy variables for each cross-sectional unit to the OLS model and conducts an F-test to determine if the sum of squared error of the OLS estimates is significantly different from the sum of squared error after the dummy variables are added. If heteroscedasticity does occur, one simply reports the DVLS estimates of the effects of the independent variables on the dependent variable (See Holbrook 1991; Sayrs 1989). Since one must control for heteroscedasticity before autocorrelation can be detected (Sayrs 1989, 19), the DVLS models are compared with the OLS models first. Then, tests for autocorrelation are conducted.

SPECIAL SITUATIONS IN TREATING THE DATA

This project requires that decisions be made concerning how certain data will be treated. First of all, some decision criterion must be formulated for dealing with uncontested elections. Second, a rule concerning how multimember districts will be coded must be developed. Third, there must be a decision criterion for the treatment of third-party candidacies.
Uncontested Elections

Uncontested elections must be dealt with in an analysis of elections, and there are different views about how the researcher should treat them. Because the hypothetical approach allows for estimates of changes in seats given incremental shifts in the two-party vote, the representation parameters will not be affected until the two-party vote is plotted to extreme positions that are virtually unattainable. However, since hypothetical elections are being plotted across the entire possibility of mean district-level Republican votes, uncontested elections could affect the fit of the regression line and therefore might affect the calculation of representational form and partisan bias.

To examine how the decision rule for treating uncontested elections influences the calculation of election results, it is necessary to illustrate how district election results would be coded under various schemes. Election totals for districts in a hypothetical state are provided in Table 4.4. The first column in Table 4.4 specifies the various districts. The second and third columns give the raw votes for the Democratic and Republican candidates, respectively. The fourth and fifth columns provide the percentage of the vote won by the Democratic partisans and the Republican candidates' percentage of the vote, respectively. Notice that winners in uncontested
races are awarded 100% of the vote while losers receive 0% of the vote.

**Awarding uncontested "losers" no votes.** Ansolabehere, Brady, and Fiorina (1988), Holbrook and Tidmarsh (1991), Niemi and Jackman (1991), and Niemi, Jackman, and Winsky (1990) suggest that the party that does not contest a seat should be awarded no votes. The results in Table 4.4, therefore, mirror election results using the procedure described by these three groups of researchers. The mean percentage of district votes for the Democrats is 49.36% and the comparable figure for the Republicans is 50.64%. Thus, the Democrats win five seats with a mean of less than 50% of the votes. This example illustrates one weakness of including uncontested elections and averaging district percentages: one can exaggerate the actual electoral strength of a state party if that party happens to do extremely well in a minority of districts. Nonetheless, this particular vote counting method is truer to the actual election results than are many of the other approaches that are suggested by scholars.

**Excluding uncontested races.** Gryski, Reed, and Elliott (1990) exclude uncontested single-member district races and they apparently exclude races for uncontested members as well. Excluding uncontested elections is problematic since there are many multimember districts in which the
<table>
<thead>
<tr>
<th>DISTRICT</th>
<th>DEMO VOTE</th>
<th>REPUB VOTE</th>
<th>DEMO %</th>
<th>REPUB %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>139</td>
<td>92</td>
<td>60.17</td>
<td>39.83</td>
</tr>
<tr>
<td>2</td>
<td>36</td>
<td>0</td>
<td>100.00</td>
<td>0.00</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>30</td>
<td>0.00</td>
<td>100.00</td>
</tr>
<tr>
<td>4</td>
<td>122</td>
<td>52</td>
<td>70.11</td>
<td>29.89</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>61</td>
<td>0.00</td>
<td>100.00</td>
</tr>
<tr>
<td>6</td>
<td>46</td>
<td>135</td>
<td>25.41</td>
<td>74.59</td>
</tr>
<tr>
<td>7</td>
<td>128</td>
<td>69</td>
<td>64.97</td>
<td>35.03</td>
</tr>
<tr>
<td>8</td>
<td>124</td>
<td>43</td>
<td>74.25</td>
<td>25.75</td>
</tr>
</tbody>
</table>
Republicans cannot produce enough viable candidates to contest for each seat (Niemi, Jackman, and Winsky 1990). Using the data from Table 4.4 and dropping the uncontested elections, the Democrats win five seats with 58.98% of the mean district vote and the Republicans win three seats with 41.02% of the mean district vote. In this example, Democratic strength at the state level may be slightly overestimated since districts won by Republicans are disproportionately uncontested. Another argument against using this method is the fact that a large amount of data that could add to our understanding of state legislative elections would have to be excluded from the analysis.

**Averaging party percentages.** Jewell (1982), Jewell and Breaux (1989), and Weber, Tucker and Brace (1991) offer slightly different techniques designed to present a "more accurate" measure of party competition. Jewell's approach is actually applied to party primary elections (Jewell 1982, 193, n. 2):

> [With no uncontested elections] the percentage [is] found by dividing the vote of each winning candidate by the total vote for all candidates, and multiplying that by the number of seats in the district. If [there are uncontested elections], the average vote for all losing candidates [is] calculated. This figure [is] added to the denominator as many times as there [are] missing candidates, before the percentage [is] calculated. The purpose of doing this is to provide an approximate measure of the closeness of each winner to the losers and avoid inflating the margin of winners.
Of course, this approach is unacceptable on its face because it places winner and losers, rather than opposition party candidates, in the numerator and denominator. Nevertheless, the averaging technique may have some beneficial qualities.

Jewell and Breaux (1989) and Weber, Tucker, and Brace (1991), in reference to uncontested multimember districts, calculate partisan averages by taking a candidate’s votes and dividing the votes by the number of candidates from the same party running in the district (1989, 6). “The purpose is to provide a more accurate measure of the party’s voting strength in each district, and ultimately in the state. It assumes that, faced with less than a full slate of candidates, many partisans will reduce the number of votes they cast rather than cross party lines (1989. 6).” The problem with this technique is that in some districts, when the average partisan vote for a loser is substituted for zero votes, there is the possibility that the "loser" will receive more votes than were actually won by a winner.

One can conceivably produce a new calculation technique by combining the approach of Jewell with the approach of Jewell and Breaux and Weber, Tucker, and Brace. For instance, one can substitute in place of zero votes for an "uncontested seat loser" and the actual votes won by an "uncontested seat winner" the average for the relevant party’s contested seat losers and winners, respectively.
To use the data from Table 4.4 as an example, the Democratic winner in District 2 can be given 128 votes (the mean for Democratic contested seat winners) and the Republican winners in Districts 3 and 5 can be said to have produced 135 votes (the mean for Republican contested seat winners). Likewise, the Democratic losers in Districts 3 and 5 can be credited with 46 votes and the Republican loser in District 2 can be provided with 64 votes.

The hypothetical values in the above paragraph simulate what possibly would have happened if the races had been contested. Once again, the strengths of such an endeavor are that one does not have to exclude uncontested elections, winners' margins should be less inflated, and a more accurate picture of partisan voting strength in the state is (arguably) produced. The disadvantage of using such a method is that one is tampering with actual election returns to simulate what might have occurred if certain conditions had been met. The application of this approach to the data in Table 4.4 gives the Democrats five seats with a mean district vote of 51.55% and the Republicans three seats with a mean district vote of 48.45%. In this particular example, the technique disinflates the Democratic percent of the mean district vote as compared to the Democratic vote generated by excluding uncontested elections. Yet, at the same time, this method (unlike the approach in which one gives the uncontested winners 100% of
the vote and the losers 0% of the vote), does give the Democrats (who, after all, won a majority of the seats) a majority of the two-party mean district vote.

**Using a normal vote.** An approach that is similar in application and in rationale to the modified Jewell and Breaux and Weber, Tucker, and Brace method is to substitute some estimate of a district "normal" partisan vote for the actual vote totals produced in uncontested elections (Gelman and King 1990). This technique is beneficial in that it controls somewhat for candidates who are electorally strong because of factors that may be unrelated to party affiliation. Nonetheless, such an approach does have its weaknesses.

Presumably, one needs to rely on previous election results to arrive at a normal vote figure for a district. Backstrom, Robins, and Eller (1978) search for a single recent election that typifies the state normal vote in their study of Minnesota. Such an approach is satisfactory if one is dealing with a very small number of states, particularly if one is intimately familiar with the history of the state(s). For purposes of the present effort, however, it would be more realistic to choose another method of dealing with uncontested elections. Gathering data on previous elections may be difficult, especially if redistricting has occurred in the recent past. One might resort to precinct-level data to avoid the redistricting
dilemma, but precinct-level data would be difficult or even impossible to acquire for all the states (or even for a large number of states) in a reasonable length of time. Also, district-level data have only been gathered by the ICPSR since 1968; thus, an additional effort would have to be made to collect pre-1968 data to determine the normal partisan district vote in the early elections in the 1968-1986 time series. Finally, if a district has had one or more uncontested seats for a number of elections the problem of uncontested elections has not been solved. One must still come up with some method of dealing with such districts.

Unfortunately, there is no clear consensus in the literature as to how uncontested elections should be treated. Any of the three or four methods discussed above can be justified so long as the decision criterion is applied to all uncontested races in the time series. However, the technique of using actual data and coding winners with 100% of the vote and losers with 0% of the vote appears to be the most satisfying approach to take. It is the method that is used in the present study. Using the actual results is simple in that it alleviates the problem of calculating partisan averages for winners and losers and alleviates the problem of tampering with actual election returns. Furthermore, it is satisfying in that the researcher is permitted to use all the available
election results as the basis from which uniform partisan swings will be calculated.

The consequence of including uncontested races is that some seats will change hands only after a 50% (or, for purposes of this study, a 51%) vote swing. During the estimation procedure, this could cause state representational form coefficients to behave in different ways depending on the number of uncontested elections in the state. In most states, using uncontested districts may cause the regression line to be more flat in the middle of the distribution than would be the case if only uncontested races were included because much of the change in seats will occur in the tails of the distribution. However, in a state in which there is an extremely large number of uncontested elections, the representational form coefficient may be quite high because a large number of seats will change hands close to the 50% range of the minority party's vote percentage. The latter phenomenon is only prone to occur in the Deep South, however. The inflation of the representational form value due to what amounts to an artificial strengthening of party competition will be accounted for in the analysis. It can be argued, I think, that the representational form parameters in most states identify more closely the reality of the election system than would be the case if uncontested elections were excluded.
Multimember Districts

An additional challenge is to determine how multimember districts should be treated. One option, of course, would be to exclude multimember districts from the analysis (Basehart and Comer 1991; Holbrook and Tidmarch 1991). However, much data would be unused. Furthermore, there have been suggestions about how multimember districts could be treated.

The consensus seems to be that researchers pair the Democrat having the highest vote and the Republican having the lowest vote, etc. "The rationale is straightforward: the Democratic candidate with the highest vote would not be defeated until he or she received fewer votes than the weakest Republican candidate, the next-highest Democrat would not lose until he received fewer votes than the second-lowest Republican, and so on" (Niemi and Jackman 1991, 200, n. 3; also see Jewell 1982, 193, n. 2 and Niemi, Jackman, and Winsky 1990, 8-9). If there is no Republican candidate that can be paired with a Democrat (or vice versa), then an uncontested seat is created.

In essence, the researcher using the aforementioned approach creates "pseudo-pairs of individual candidates that can be analyzed just as if they were [single-member districts]" (Niemi, Jackman, and Winsky 1990, 8). In multimember districts in which a number of pairs of candidates run against each other ("post" multimember
districts), the results already mirror single-member district elections. It is in reference to "free-for-all" multimember districts and floterial districts (a district in which one or more representative[s] is [are] elected by voters from a number of smaller districts) that are awarded on a "free-for-all" basis that the creation of pseudo-single-member districts becomes necessary. For example consider the case in which three Democratic candidates win 530, 520, and 470 votes, respectively, and three Republicans respectively garner 510, 490, and 480 votes. Clearly, the Democrats would win two seats while the Republicans would win one seat. This election would be coded as three single-member districts as follows:

Dem. votes: 470 520 530
Rep. votes: 510 490 480

Dem. % of two-party vote = 48.0, 51.5, 52.5

This procedure is beneficial for a reason other than that it allows the researcher to match a candidate who won a seat with a vote percentage greater than 50%. The process permits the researcher to weight the races equally by averaging all the race percentages to calculate the party vote in the state. Such an averaging approach alleviates the problem of having districts with large turnout unduly affect the results of any given election. In essence, variables that affect turnout in one district and not in others (i.e., idiosyncratically) are controlled
Third-Party Candidacies

Another problem that may be manifested is the possible existence of candidates from third parties. Because this project consists of data from only 1968 to 1986, there certainly are fewer cases in which minor party candidates and other groups that splintered from the two major parties (or were antecedents of the latter) are contenders. However, given the strength of minor parties in certain states, third-party candidacies must be faced.

King and Browning (1987) address this problem in their study on the U.S. Congress. They "delete the very few representatives who had won seats under the independent-party label and subtract the votes received by their Democratic and Republican opponent from the statewide total (1987, 1260)." Niemi, Jackman, and Winsky (1990, 6, n. 5) suggest that three equally appropriate possibilities exist at the state level. According to the latter, minor party votes can be eliminated if they make up a small percentage of all votes, they can be counted as major party votes if the minor party serves as a local version of a major party (as with the Democratic-Farmer-Labor Party in Minnesota), or they can be combined with major party votes in states such as New York where established minor parties endorse candidates from the major parties.
Garand, Parent, and Teague (1989) include third-party votes and utilize them in a unique way in their electoral college study. Since they use the uniform partisan swing approach, their technique is particularly well suited to the present study. They hold the minor party vote constant when they apply the uniform partisan swing to the major party candidates across states. As they point out, "in most years, the third party electoral vote remained constant across all hypothetical configurations of the popular vote." However, in the cases in which a decrease in the vote for a major party candidate winning the state allowed the third party candidate to win the state, they "adjusted the electoral vote total to reflect the minor party victory in that state (1989, 20, n. 5)." In other words, a minor party candidate running a close second can be declared the "winner" in a hypothetical election should the actual winner's vote percentage decline below that of the third party candidate during a hypothetical vote swing.

Following the theory that as little data as possible should be excluded, it seems best to include third-party candidacies. The Garand, Parent, and Teague approach appears to be particularly relevant to the data application technique adopted in this study. While it is more the exception than the rule, third-party candidates do occasionally garner more than minimal votes and run first or second in state legislative elections. However, in cases
where third-party candidates present a clear pattern of running as members of a major party but decide for some reason to deviate from their normal party affiliation for one election, one could argue that such a person should be coded as a member of the major party on whose ticket he or she usually runs. It seems reasonable that voters who are accustomed to voting for a major party candidate who runs as an independent or a third party candidate still see themselves as voting for the candidate as a member of his or her normal party. In addition, one should expect that a candidate who wins election as a minor party candidate but who is regularly affiliated with a major party will vote with rather than against the major party in roll-call voting in the legislature.

Therefore, in cases where the minor party candidate runs first or second and receives more than 10% of the district vote, the author examines the preceding and subsequent elections. In the three-election series formulated by preceding, present, and subsequent elections, the candidate is coded as a major party candidate if he or she runs as a major party candidate twice or if he or she runs only twice and runs once as a major party candidate. The person will be coded as a third-party candidate if he or she only runs once (and runs as a third-party candidate) or if he or she runs at least twice and runs as a minor-party candidate two times. In the cases of elections in 1968 and 1986, the
presumption is taken toward coding the candidate as a member of a major party unless the person only runs once (and runs as a minor-party candidate) or if he or she runs twice as a minor party candidate.

Two states present unique problems in the area of third-party candidacies. Minnesota has no candidates from the Republican Party or the Democratic Party in elections from 1968 to 1974. However, the Minnesota House races do have two "minor" parties that contest almost every seat during this time period. These two parties are the Democratic Farmer Labor Party and the Independent Republican Party. Neither of these parties are tied to the national Democratic or Republican parties, yet candidates from these two parties win almost every seat in the state legislature during the 1968-74 time period. Despite the fact that these parties are statewide parties only, it seems obvious that the two parties serve the same general constituencies and have the same relative ideological positions as the two traditional American parties. Therefore, candidates from the Democratic Farmer Labor Party will be coded as Democrats and candidates from the Independent Republican Party will be coded as Republicans.

The State of New York also presents some difficulties. In New York, individual candidates are often endorsed by more than one party. This fact alone is not troubling. What is problematic is the fact that election returns are
reported separately for each party's candidate. This means that a person who receives more than one party's nomination is listed more than once along with his or her vote totals from each party ballot. The problem is that a person can win the most total votes (and be declared the winner) but receive less than a majority of the major party votes.

For example, if Joe Smith won 15,000 votes from Republican ballots and 5,000 votes from Conservative Party ballots, he would win a total of 20,000 votes. If John Brown won 18,000 Democratic ballot votes and 1,000 Liberal Party ballot votes, John Brown would have a total of 19,000 votes. Joe Smith would win the election, but the Democrats would have outpolled the Republicans 19,000 to 18,000. Perhaps it would be wise to add all votes won by each major party candidate and consider them to be major party votes. However, this technique would be quite time consuming and presents philosophical problems about the intentions of voters from the Conservative Party and the Liberal Party. There would also be the question of what to do with Conservative and Liberal candidates who run against major party opposition from their respective ideological ends of the spectrum. For these reasons, it seems most appropriate to exclude elections from New York State from the analysis.

Other problems with parties also force the researcher to drop Louisiana and Nebraska from the analysis. In the case of the former, the advent of open primaries has
resulted in primary elections that serve as general elections in most cases. This is not problematic except for the fact that the ICPSR has decided to report Louisiana general election results in the primary election section of the large state legislative data set. For the latter, nonpartisan elections make it impossible to measure partisan bias and representational form.

Finally, the state of New Hampshire presents the researcher with a unique dilemma. In this state, particularly in the early part of the time series, it is common for a person to receive the endorsements of, and actually run in the general election under the banner of, both major parties. In the ICPSR data set, the winning party in such a district (despite the fact that the winning and losing candidates are the same person) is the party that received the most votes. Therefore, if candidate A wins 3,000 votes as a Democrat and 5,000 votes as a Republican, the seat is considered to be Republican. The decision on how to treat these vote percentages is to drop the votes for the losing party and keep the votes for the winning party, thus making this an uncontested seat. The thinking is that despite the fact that the candidate ran under the banner of both parties, he or she was identified by the voters primarily as a member of one party. The assumption is that this person would behave in the legislature more closely as a member of the party from which he or she got the most votes.
Furthermore, since the person ran only against himself or herself, it seems reasonable to treat the district as uncontested by the "losing party." The treatment of these districts seems valid because when one follows the legislative election careers of these candidates they always either receive the most votes from the same party or receive opposition from other candidates endorsed by the "losing party" in subsequent elections.

In summary, there are some decisions that have been made on how best to treat the data in this dissertation. First, uncontested elections are included in the analysis. Winners are credited with 100% of the vote and losers are given 0% of the vote. This approach to uncontested races is simple in application and is satisfying in the sense that the researcher can make use of all the available data in testing his or her hypotheses. The result of using this technique is that election systems may be found to be less responsive to partisan vote shifts than would be the case if uncontested elections were excluded from the analysis. Second, multimember districts are used in this dissertation. The technique is to pair the highest vote winners from one party with the lowest vote getters from the opposition party to create pseudo-single member districts that can be analyzed identically to single member districts. Finally, third-party candidates are included in this study. In cases where individuals who can be identified as major
party candidates run as third-party candidates as a deviation to their common pattern, they will be recoded as candidates of the party from which they typically run.

CONCLUSION

In this chapter, I have discussed the data and the methods I use to test the hypotheses concerning representational form and partisan bias that were explained in Chapter Three. I have described the district-level data on state legislative elections from 1968 to 1987 that were placed in machine readable format by the ICPSR and that are used in this dissertation. Explanation was provided of the technique by which a logit model is used to identify representational form and partisan bias parameters for 441 state legislative elections. Furthermore, I provided a description of the steps that were taken to manipulate the data and a brief explanation of how pooled data is employed in this study.

In addition, I presented my models that are used to explain variation in representational form and partisan bias. Representational form is believed to be a function of the distribution of partisan votes at the district level and election rule variables such as the size of districts (by population) and the number of seats in the state. Partisan bias is expected to be a function of one party's ability to control the redistricting machinery and willingness to redraw district lines to benefit their candidates.
Finally, I detailed the other dilemmas in treating the data in this study and the steps that were taken to solve these dilemmas. Specifically, I have decided to: (a) include uncontested elections, awarding the winners 100% and the losers 0% of the district vote; (b) include multimember districts, pairing the highest vote winner from one party with the lowest vote winner in the other party to create quasi single-member districts; (c) include third-party candidates, yet coding third party candidates that typically run as major party candidates as members of the major party with which they usually affiliate. I also discussed the decisions in dealing with party affiliation in a handful of states that offered idiosyncrasies that were relevant to the coding process.

In Chapter Five, I describe the findings concerning the parameter values for representational form and partisan bias. I provide figures and descriptive comments about the frequency of particular values for representational form and partisan bias in the aggregate. In addition, I provide a detailed analysis of representational form and bias values for each election year. I also highlight trends for bias and representational form over the time series as a whole. I identify the states that produce extremely large and extremely small values of representational form and partisan bias. I conclude the chapter with a discussion of how my findings compare with other studies that have been
made using the same approach to studying the seats-votes relationship.
NOTES

1. While it might be noted that the King and Browning equation is slightly different from the equation used by the majority of practitioners, it should be pointed out that the more commonly used log transformation of the Tufte linear equation is algebraically equivalent to the equation used by King and Browning (Campagna and Grofman 1990, 1244; Gryski, Reed, and Elliot 1990, 144-45, 156, n. 3).

2. In order to quantify the average partisan district vote, the data must be recoded such that each district is a case. A computer program is created which allows the researcher to print out the election results by state, by year, by district, and by party, respectively, and place these data in a file. Next, another program is created that reads each district as a three-line set of information and converts vote totals to percentages; each line contains information on the candidate’s name, party, vote total, and a dummy variable indicating whether the candidate won or lost. The first line of each district contains information on Democratic candidates, the second line provides the same information on Republican candidates, and the third line has information pertaining to third-party candidates, where appropriate. In cases in which there are uncontested seats, a line must be manually included for each party that does not have a candidate running (in which case the program reads the relevant candidate’s percentage of the vote as 0). In addition, for multimember districts this is the step in which the largest vote winner from one party is paired with the smallest vote winner from the other party to create quasi-single member districts. In the multi-member district cases, the highest third-party vote winner is placed in the same quasi-single member district as the winner with the lowest vote total. In the rare instances in which there are more candidates from a single party running in a district than there are seats in the district (e.g., two Democrats running in a single-member district), the smallest vote winner from the relevant party is deleted from the analysis.

3. This index is computed in this study as 1 - (2 * Republican % of two-party vote - .5). This is the folded Ranney index used by Bibby, Cotter, Gibson, and Huckshorn (1990) and Holbrook and Tidmarch (1991). In this study, of course, the index is applied only to mean district-level partisan vote in the lower house state legislative elections in the analysis.
4. It is because the natural log of bias measures bias as deviation from zero that this measure, rather than the antilog of the natural log of bias, is used to measure partisan bias. Since the hypotheses related to partisan bias are tested with the assumption that bias is measured as some deviation from zero (i.e., as being positive or negative), one must employ the natural log of bias as the measure of bias. The antilog of the natural log of bias is less acceptable since bias is measured as a deviation from one.

5. As noted by Niemi and Jackman (1989, 10), there is a bit of circularity in the King approach in that party control of the redistricting machinery is determined after a content analysis of records of the redistricting has been made. Nonetheless, a mechanical coding of the redistricting by which a party controls two (or three) institutions of state government combined with the assumption that all court plans will not be biased may miss the nuances of a particular redistricting. For the record, Niemi and Jackman perform an analysis using the party control of government method and the party control of redistricting method formulated by King and find very little difference in results. In a majority of cases, the redistrictings in the states are coded the same regardless of the coding approach that is used. In fact, 24 of the 39 (62%) redistrictings in the 1970s and 35 of the 49 (71%) redistrictings in the 1980s were coded the same (Niemi and Jackman, 1989, Tables 1 and 3).
CHAPTER FIVE: A DESCRIPTION OF THE SEATS-VOTES CURVES

In this chapter, I describe the findings pertaining to the values of the representational form and partisan bias coefficients for the U.S. state legislative elections in this analysis. On one hand, then, this chapter presents the results for the first goal of the dissertation. On the other hand, this chapter serves as an introduction to the next chapter in which the results of the models used to explain variation in bias and representational form are reported.

At the beginning of the chapter, I display graphically a variety of patterns of representational form and partisan bias that are found in state legislative elections from 1968 to 1986. Because the findings concerning representational form values are especially provocative, I provide tables listing the values of representational form parameters by state for each election in the time series. In the second section of the chapter, I focus more on the results pertaining to representational form. Comparisons are drawn between my findings and the findings of other scholars studying the seats-votes relationship. I then provide a descriptive account of the patterns of representational form in each election year. Figures are provided to illustrate the trends in representational form (and bias, as well) over time.
In the third section of the chapter, I compare my findings related to partisan bias with those of other researchers who are concerned with U. S. state legislative elections. In addition to discussing these findings, I also report the descriptive statistics associated with elections in each year. I also discuss the state-by-state trends in partisan bias and refer to figures to illustrate these trends. Finally, I note the mean levels of representational form and partisan bias in each state for the time series as a whole.

FINDINGS CONCERNING SEATS-VOTES CURVES

As noted earlier, the uniform partisan swing approach for studying seats-votes relationships, in conjunction with a log-odds model, produces two parameters that are of interest in the present research. In addition, one can use these approaches and other techniques to visualize this relationship between votes and seat allocation. Using the uniform partisan swing approach allows the researcher to obtain 31 data points. These data points permit one to apply a regression model to estimate partisan bias and representational form for an election system in a particular year. One can utilize the parameter estimates to chart a new "best fit" seats-votes curve.

In theory, seats-votes relationships can take on an infinite number of forms. Stated simply, there are a number of patterns by which legislative seats change hands.
from one party to the other in association with changes in partisan percent of the vote. Likewise, there is a wide range of values that partisan bias can take. Application of the techniques previously explained results in a number of patterns of partisan bias and representational form in U. S. state legislative elections.

Figures 5.1(a) through 5.1(d) show observed and no bias seats-votes curves for four elections. These figures present actual results taken from the U. S. states and are intended to typify the various values for bias and representational form that are found in the U. S. states.

Before these seats-votes curves are described, an explanation of how these figures are produced is offered.

To produce a seats-votes curve in a particular state legislative election, I calculated the percentage of seats Republicans would win if they win from 35% to 65% of the vote (inclusive). Applying Equation 4.4 to these data, I produce the representational form parameter and the partisan bias parameter for the election. I next used the mean Republican percentage of the district vote in the election to calculate a log-odds ratio:

\[
\text{OREPPCT} = \frac{\text{REPCT}}{1 - \text{REPCT}}
\]

Then, I substituted the representational form value, the partisan bias value, and the log-odds ratio into an equation to produce a predicted value for Republican percentage
Figure 5.1(a):
Seats-Votes Curve, North Dakota
House of Representatives, 1968

Figure 5.1(b):
Seats-Votes Curve, Georgia
House of Representatives, 1984

Figure 5.1(c):
Seats-Votes Curve, Utah
House of Representatives, 1984

Figure 5.1(d):
Seats-Votes Curve, Georgia
House of Representatives, 1980
of seats for each percentage of the vote won by Republicans from 0% to 100%:

\[
\text{STATE1968} = (\text{BIAS}) \times \text{OREPPCT} \times \text{FORM}
\]

(5.2)

A seats-votes curve that is devoid of partisan bias can be produced in a similar manner, except that a value of 1.0 is substituted for the bias coefficient in Equation 5.2. These values for both the "observed" and "no bias" curves are then plotted on an x- and y- axis.

As Figures 5.1(a) through 5.1(d) make clear, there is a wide variety of levels of representational form and partisan bias present in U. S. state legislative elections. However, closer scrutiny of the elections allows one to make generalizations about the patterns that are revealed by the data. Figure 5.1(a) illustrates the results from the 1968 election to the North Dakota House of Representatives, Figure 5.1(b) presents results from the Georgia House of Representatives election of 1984, Figure 5.1(c) shows the seats-votes curves for the 1984 Utah House of Representatives election, and Figure 5.1(d) depicts the curves for the Georgia House of Representatives election of 1980. Each of these figures is intended to emphasize a different value among the range of values for bias and representational form that were discovered to exist among the states.

The North Dakota House election in 1968, plotted in Figure 5.1(a), is characterized by the largest
representational form coefficient of any state in the time series. The form coefficient of 5.337 indicates that this particular election system was very responsive to vote changes at the middle range of the distribution. The seats-votes curve in this election is even more steep than what would be generated in an election conforming to the cube law standard of representational form. For example, at 40% of the votes, Republicans win only about 13% of the seats. However, Republican seat gains rise dramatically between the 40% and 60% vote marks. In fact, at 55% of the votes Republicans win a whopping 79% of the seats. Incidentally, there is a moderately large bias toward the Republicans in this election. Republicans win 56% of the seats at 50% of the vote.¹

Figure 5.1(b) is used to emphasize an unresponsive representational pattern of seats-votes relationship. The Georgia House election of 1984 exhibits a representational form coefficient, 0.098, that is much lower than the 1.00 produced by a proportional representation system. The extreme lack of responsiveness at most points on the distribution can be visualized by noting that Republicans gain very few seats by moving from 40% of the vote (30% of the seats) to 60% of the vote (32% of the seats). In fact, the no bias curve in Figure 5.1(b), which charts the responsiveness of seat change to vote change assuming the absence of partisan bias, is virtually flat except at the points at
which Republicans get 0% and 100% of the votes. Of course, the difference between the observed curve and the no bias curve in Figure 5.1(b) does reveal a large Democratic bias in the system. For example, at 50% of the votes the Republicans actually win only 31% of the seats.

Figure 5.1(c) provides a graphic illustration of an election bereft of partisan bias. The 1984 Utah House election had a representational form that was majoritarian, but there was no partisan bias in the system. That is to say, the best fit curve of the observed values for seats and votes reveals that Republicans receive 50% of the legislative seats when they win 50% of the mean district-level votes. At some points along the distribution Republicans win more or fewer percentage of seats than votes, but any differences are due to the majoritarian nature of the seats-votes relationship rather than to partisan bias.

The Georgia House election of 1980 provides a classic case of high levels of partisan bias. As one can see from examining Figure 5.1(d), there is a large deviation between the no bias curve and the observed values curve. This election, like the Georgia election of 1984, is interesting from the standpoint that the representational form coefficient is less than 1.0. Though seat changes are very unresponsive to vote shifts over much of the distribution (including the area near the 50% mark), it is the extremely large Democratic bias that makes this election stand out.
While almost all elections have some degree of bias, the graph for the Georgia election of 1980 reveals a tremendous level of bias. At 50% of the votes, Republicans win only 26% of the seats. In fact, to win a majority of seats Republicans have to win 96% of the votes. Such a remarkable level of bias can perhaps be at least partly attributed to the existence of a large number of victories by Democrats who ran uncontested.

When one looks at the mean values of representational form for each state reported in Table 5.1, one is struck by the proliferation of values that are smaller than 3.0. In fact, only four states exhibit coefficients that exceed the 3.0 value of the classic majoritarian scheme. There are three additional states, all in the south, that produce the kind of artificially large form coefficient described in Chapter Four. It is a testimony to the lack of responsiveness to vote changes at much of the seat-vote distribution in U. S. state legislative elections that the highest mean form parameter for non-southern states is 4.260.

In fact, a few states (11, if one counts the odd southern states) have representational form values below 1.0. With a lack of partisan bias in such an election system, the graph of the seats-votes curve would resemble the no bias curve in Figure 5.1(b). Such an election system could be viewed in two ways.
Table 5.1. Mean Rep. Form and Bias, by State

<table>
<thead>
<tr>
<th>State</th>
<th>Representational Form</th>
<th>Partisan Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>4.209 (0.759)*</td>
<td>0.440 (-0.341)</td>
</tr>
<tr>
<td>Alaska</td>
<td>2.803</td>
<td>0.286</td>
</tr>
<tr>
<td>Arizona</td>
<td>1.480</td>
<td>0.328</td>
</tr>
<tr>
<td>Arkansas</td>
<td>7.814 (---)</td>
<td>0.628 (---)</td>
</tr>
<tr>
<td>California</td>
<td>1.725</td>
<td>0.019</td>
</tr>
<tr>
<td>Colorado</td>
<td>2.190</td>
<td>0.169</td>
</tr>
<tr>
<td>Connecticut</td>
<td>2.799</td>
<td>0.097</td>
</tr>
<tr>
<td>Delaware</td>
<td>2.287</td>
<td>0.031</td>
</tr>
<tr>
<td>Florida</td>
<td>0.862</td>
<td>0.011</td>
</tr>
<tr>
<td>Georgia</td>
<td>0.700 (0.202)</td>
<td>-0.833 (-0.875)</td>
</tr>
<tr>
<td>Hawaii</td>
<td>1.308</td>
<td>-0.100</td>
</tr>
<tr>
<td>Idaho</td>
<td>2.227</td>
<td>0.026</td>
</tr>
<tr>
<td>Illinois</td>
<td>0.817</td>
<td>-0.025</td>
</tr>
<tr>
<td>Indiana</td>
<td>3.245</td>
<td>0.091</td>
</tr>
<tr>
<td>Iowa</td>
<td>2.795</td>
<td>-0.042</td>
</tr>
<tr>
<td>Kansas</td>
<td>1.959</td>
<td>0.032</td>
</tr>
<tr>
<td>Kentucky</td>
<td>1.032</td>
<td>-0.134</td>
</tr>
<tr>
<td>Maine</td>
<td>1.946</td>
<td>0.192</td>
</tr>
<tr>
<td>Maryland</td>
<td>1.200</td>
<td>0.044</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>0.843</td>
<td>-0.314</td>
</tr>
<tr>
<td>Michigan</td>
<td>1.314</td>
<td>0.095</td>
</tr>
<tr>
<td>Minnesota</td>
<td>2.379</td>
<td>0.110</td>
</tr>
<tr>
<td>Mississippi</td>
<td>6.278 (---)</td>
<td>0.596 (---)</td>
</tr>
<tr>
<td>Missouri</td>
<td>1.371</td>
<td>-0.039</td>
</tr>
<tr>
<td>Montana</td>
<td>2.488</td>
<td>0.250</td>
</tr>
<tr>
<td>Nevada</td>
<td>1.852</td>
<td>0.006</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>1.429</td>
<td>0.078</td>
</tr>
<tr>
<td>New Jersey</td>
<td>3.001</td>
<td>0.117</td>
</tr>
<tr>
<td>New Mexico</td>
<td>1.952</td>
<td>0.108</td>
</tr>
<tr>
<td>North Carolina</td>
<td>0.904</td>
<td>0.099</td>
</tr>
<tr>
<td>North Dakota</td>
<td>4.260</td>
<td>0.041</td>
</tr>
<tr>
<td>Ohio</td>
<td>1.871</td>
<td>0.071</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>0.607</td>
<td>-0.238</td>
</tr>
<tr>
<td>Oregon</td>
<td>2.448</td>
<td>0.015</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>1.654</td>
<td>0.110</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>1.911</td>
<td>0.003</td>
</tr>
<tr>
<td>South Carolina</td>
<td>1.536 (0.595)</td>
<td>-0.215 (-0.375)</td>
</tr>
<tr>
<td>South Dakota</td>
<td>3.477</td>
<td>-0.115</td>
</tr>
<tr>
<td>Tennessee</td>
<td>0.834</td>
<td>-0.028</td>
</tr>
<tr>
<td>Texas</td>
<td>0.553</td>
<td>-0.338</td>
</tr>
<tr>
<td>Utah</td>
<td>2.759</td>
<td>0.045</td>
</tr>
<tr>
<td>Virginia</td>
<td>0.890</td>
<td>-0.057</td>
</tr>
<tr>
<td>Washington</td>
<td>2.169</td>
<td>0.073</td>
</tr>
<tr>
<td>West Virginia</td>
<td>2.081</td>
<td>0.281</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>1.780</td>
<td>0.023</td>
</tr>
<tr>
<td>Wyoming</td>
<td>2.578</td>
<td>-0.208</td>
</tr>
</tbody>
</table>

*Mean form and bias after dropping 24 problem elections.
First, one could bemoan the lack of responsiveness in an election system that has a representational form value of less than 1.0. Such a system could perhaps be characterized by incumbents who, because of a lack of party competition (particularly in the South) or beneficial reapportionment schemes, rarely receive a serious challenge in general elections. In fact, most states have coefficients in the 1.00 to 3.00 range. The majority of the states, therefore, do have election systems that are slightly majoritarian.

On the other hand, however, if the representational form coefficient is only slightly less than 1.0, an argument could be made that the election system is more clearly responsive to public opinion than is a highly majoritarian system. A system that is nearly proportional places in the legislature a ratio of partisans that more nearly reflects the partisan nature of the vote than does a majoritarian system. Nonetheless, extremely unresponsive systems like Texas (0.553), Oklahoma (0.607), South Carolina (0.595) and Georgia (0.202) call into question the utility of voters changing their voting patterns. For example, few democratic theorists would praise the Oklahoma system in 1980 when Republicans would have won 30% of the seats at 35% of the vote and only 40% of the seats at 65% of the vote.

The figures in Appendix A illustrate the representational form values of each election in the 46 states from
1968 to 1987. As one can see in Appendix A, most values clearly fall into the 1.00 to 3.00 range. On the whole, one could suggest that U. S. state election systems are slightly majoritarian in nature. That is to say, in most elections, seat changes are more responsive to partisan vote shifts in the competitive range than is the case in a proportional system. However, seat changes in the competitive range in these elections are less responsive to vote shifts than would be the case in the classic "cube law" electoral system.

Of course, there are some elections that deviate from the general trend. On one hand, approximately half the states have at least one election in the time series in which the representational form value is larger than 3.00. On the other hand, however, 15 states have at least two elections where representational form values fall below 1.00; in fact, most of these states have at least two elections where the values are lower than 0.67. Even the most ardent advocate of the concept of proportional representation might be disturbed by the lack of responsiveness in the latter election systems.

A word should be added about a number of election systems in southern states. It was the case in 417 of the 441 elections in this analysis that neither party would win 100% of the seats when Republicans would win between 35% and 65% of the votes (inclusive). In 24 election systems
in 5 southern states, Republicans would win 100% of the seats at some point in the 35% to 65% range of votes. The reason Republicans could have won all the seats within this range of votes is because so few Republicans ran in the actual elections that a 51% uniform vote swing gave Republicans all the seats. This phenomenon creates the illusion that such election systems are extremely responsive to vote shifts, when in fact they are not. High representational forms in these election systems result from the fact that Republicans won 0% of the vote in the majority of districts! An example of this phenomenon took place in the Arkansas election of 1972.

A look at the raw data from 1972 reveals that Arkansas Republicans actually won 0.8% of the votes and 1.0% of the seats. When one implements the uniform partisan vote swing (and this is before any regressions are run), one finds that Republicans win only 2% of the seats when they win 35% of the votes. However, by the time the vote swing toward Republicans gives the party 65% of the votes they win 100% of the seats. On closer inspection, one finds that Republicans actually win 100% of the seats when they win only 52% of the mean district level vote!

There are two relevant results of using uniform partisan swing on the 1972 Arkansas election system. First, an extremely large representational form coefficient (10.974) is produced simply because Republicans win 23% of the seats
at 51% of the vote and 100% of the seats at 52% of the vote. As noted earlier, however, this extreme level of responsiveness is due to the fact that most Republicans had 0% of the vote in the first place. Second, this election system and those that are similar to it produce high levels of Republican bias. It is true that Democrats win more seats (77%) at the 50% mark than do Republicans (23%). However, at most points on the graph Democrats are at a disadvantage. At the point in which each party wins 40% of the vote, Republicans win 12% of the seats while Democrats win no seats. In fact, while Republicans win all the seats when they win 52% of the votes, Democrats do not win all the seats at any point in the 50% to 65% range.

Because of the unique nature of election systems in which the minority party wins all the seats at a small percentage of the vote, these election systems will be reported in all the relevant tables but will be excluded from the discussion. These elections will also be excluded from the data analysis. However, the consequences of including the data in the data analysis will be discussed in relevant footnotes in Chapter Six. A more extensive discussion of the representational form values will be provided in the next section; a subsequent examination of the values for partisan bias will follow this discussion of representational form.
Distribution of Representational Form Values

Figure 5.2(a) illustrates the aggregate distribution of representational form values. Representational form ranges from 0.098 (Georgia, 1984) to 5.337 (North Dakota, 1968). The mean for the form coefficient is 1.855. The median value for representational form is 1.751. Over 50% of the values for representational form fall between 1.00 and 2.50, with 20% of the values ranging from 1.50 to 2.00. The standard deviation of the aggregate distribution of mean form values is 1.022. Surprisingly, 22% of the elections exhibit form coefficients that are less than 1.0. These figures are indicative of the fact that U.S. state legislative election systems as a whole are slightly majoritarian in the manner in which seats are allocated on the basis of votes.

This finding is somewhat surprising. Considering the fact that plurality winner rules are in effect in U.S. state legislative election districts, one might expect that representational form values would be larger. One explanation for these low representational form values is the fact that uncontested elections are included in the analysis. The presence of a large number of uncontested elections means that only vote shifts of 50% plus one vote would cause the relevant seats to change from one party to the other; this is why responsiveness in many of these
Figure 5.2(a):
Representational Form, 1968-1987

Mean = 1.855  Med. = 1.751  S. D. = 1.022
Max. = 5.337 (North Dakota, 1968)
Min. = 0.096 (Georgia, 1984)
elections is enhanced at the extremes or "tails" of the distribution rather than in the middle.

The representational form values for these state legislative elections are similar to findings pertaining to representational form patterns in previous research on state legislative elections. The results, on the whole, exhibit values that are close to the values produced by Campagna and Grofman (1990a) and Niemi and Jackman (1991) in their studies of state legislative elections. The representational form values are smaller than the 42 state study of Gryski, Reed, and Elliot (1990), however.

The representational form values in my study tend to be comparable to, or slightly smaller than the form values produced in studies of Congress. Dahl (1956), Tufte (1973), and Taagepera and Shugart (1989) find larger representational form parameter values in congressional elections. However, recent studies that deal with congressional elections over time (King 1990, King and Gelman 1991) and individual congressional elections (Campagna and Grofman 1990b) produce representational form values similar to those found in my study.

There are additional comparisons that can be made with other studies. Garand and Parent (1991) find a highly majoritarian pattern of representation operating in the U. S. electoral college system. Ansolabehere and King (1991) report representational form parameters in
presidential primary selection processes that are more majoritarian than the patterns found in this dissertation. However, Geer's (1986) study of presidential primaries revealed patterns that resemble the state legislative election results reported in this study.

While the representational form values in my study are comparable to those of other work on U. S. state legislatures, there are some differences. What accounts for the differences in findings between my study and the works of previous researchers? Methodological differences and different cases used in previous analyses account for discrepancies in findings. Niemi and Jackman (1991) use the multiyear historical data collection approach in their study of 47 state legislatures. Campagna (1991) and Campagna and Grofman (1990a) study 15 states that had only single-member district elections throughout the time series (thereby excluding all 11 former Confederate states). In addition, Campagna and Campagna and Grofman use the uniform partisan swing method but only examine data points from 40% to 60% of the Democratic vote rather than examining the seats-votes curve between 35% and 65% of one of the party's votes. Gryski, Reed, and Elliott (1990) use the multiyear historical method of data collection, study elections from 1976 to 1984, and exclude uncontested races from their analysis.
Figures 5.2(b) to 5.2(k) illustrate the distribution of representational form in the respective even-numbered election years. An examination of the distribution of representational form coefficients in each of these even-numbered election years reveals certain patterns and trends. There is a nearly linear trend toward lower representational form values over time. In fact, the correlation between the mean value of representational form and a trend variable is -0.275 (p < .001). The median value of form registers a similar decline. The largest median representational form value, 2.471, occurs in 1972. After 1972, each successive two-year cycle produces a decline in median form (except for 1982) until the median value falls to 1.281 in 1986. Furthermore, though the pattern is irregular, the standard deviation of the mean value of representational form declines over time. Thus, there is a pattern of decreasing representational form values that is becoming more uniform over time.

The distribution of representational form in 1968 is somewhat different from the aggregate distribution of form. Figure 5.2(b) depicts this pattern. The mean of the form coefficient in 1968, 2.319, is the largest mean value found in the time series. The median form value is 2.237 for this year. In addition, the standard deviation of the form values across states is the largest for all elections (1.279). While almost 20% of the form values fall between
Figure 5.2(b):
Representational Form, 1968

Figure 5.2(c):
Representational Form, 1970

Figure 5.2(d):
Representational Form, 1972

Figure 5.2(e):
Representational Form, 1974
Figure 5.2(f): Representational Form, 1976

Figure 5.2(g): Representational Form, 1978

Figure 5.2(h): Representational Form, 1980

Figure 5.2(i): Representational Form, 1982
Figure 5.2(j):
Representational Form, 1984

Figure 5.2(k):
Representational Form, 1986
1.0 and 1.50, there are a number of elections that exhibit relatively large representational form values. A majority (61%) of the election systems produce form values between 1.0 and 3.0. The highest representational form parameter, 5.337, is found in North Dakota. The North Dakota election for 1968 exhibits the highest representational form parameter of all the elections in this study. Furthermore, North Dakota produces the largest representational form value in each even-numbered election year except 1970 and 1976. The lowest coefficient for this election year occurs in Texas (0.365).³

Figure 5.2(c) shows a more narrow dispersion of representational form values in 1970 (standard deviation of 1.111) than in 1968. In addition, the mean value for form in 1970 declines to 2.079. The median value also drops to 2.219. The decline in standard deviation as the mean value for form declines means that there is a uniform shift to a more proportional seats-votes pattern in most state elections. Still, the overall decline in form values is small. In fact, over 50% of elections range from 1.50 to 3.50, with 20% categorized in the 3.0 to 3.50 range. However, the percentage of elections that have form values of 1.0 or lower increases from 13.9% in 1968 to 23.1% in 1970. The most majoritarian system in this year is experienced in Indiana (5.072). The lowest representational form parameter value is once again found in Georgia (0.286).
In Figure 5.2(d), one finds that values for representational form increase somewhat in 1972 and are more widely dispersed than in 1970. The mean value for form is 2.285; the median value, 2.471, is the largest for the time series. The standard deviation is 1.144. Exactly 50% of the form coefficients are between 2.0 and 3.50. The value in North Dakota is 5.063. Georgia again produces the lowest coefficient, 0.107.

In 1974, as illustrated in Figure 5.2(e), the mean (2.030) and median (1.898) of representational form decrease in what eventually becomes a precipitous decline. Thus, after 1974, the majoritarian nature of the aggregation of election systems becomes smaller (i.e., election systems are more proportional). As shown in the figure, over 56% of the values range between 1.0 and 2.50, with 23.1% falling between 1.50 and 2.0. The standard deviation in this election year is 1.024. The highest representational form is 4.797. The lowest form coefficient is the 0.565 value produced in Massachusetts.

Figure 5.2(f), depicting the form distribution in 1976, is a peculiar election year. The mean value of the form coefficients is 1.975 and the median value is 1.891; 57.9% of the elections exhibit form parameters of between 1.50 and 3.0. However, the standard deviation of 1.151 is the second highest measure of dispersion found in the time series. The wide dispersion is evidenced by the fact that
23.7% of states had values less than 1.0 (with North Carolina exhibiting a coefficient of 0.158), but 5.3% of the states had values larger than 5.0. The highest value in this election year was the 5.323 experienced by South Dakota.

As can be seen by examining Figure 5.2(g), the responsiveness of elections at the competitive range of the distribution declines again in 1978. The mean representational form value is only 1.716 and the median form coefficient is 1.749. As indicated in the figure, 26% of the form values fall between 1.50 and 2.0; 58% are between 1.0 and 2.5. This election year produces the smallest standard deviation of any election year except for 1986, 0.816. Thus, elections in this year almost universally exhibited a less majoritarian representational pattern than in preceding years. The largest representational form coefficient is only 3.881. North Carolina is once again the state with the lowest representational form coefficient with a value of 0.238.

Figure 5.2(h) shows that representational form patterns become more proportional with the coming of the 1980s. The mean value for the form parameter in 1980 is slightly larger than what one would find in a proportional system: 1.680. The median form value, 1.692, is comparable. The pattern is similar to that for 1978, with fully two-thirds of the form values falling between 1.0 and 2.50.
This distribution translates into a standard deviation of 0.871. The 4.175 representational form coefficient found in North Dakota is the only value greater than 4.0. As is the case for the remainder of the time series, Georgia has the lowest representational form coefficient (0.143).

In 1982, mean representational form rises to 1.736 and the median form coefficient increases to 1.703. Figure 5.2(i) indicates that 44% of elections have form coefficients between 1.50 and 2.50; another 20% are between 1.0 and 1.5. The standard deviation for this set of elections is 0.835. The highest value for the representational form coefficient is 3.952. The lowest value for representational form is 0.215.

In Figure 5.2(j), one can observe that 63% of elections in 1984 produce representational form coefficients in the 1.0 to 2.50 range. The mean form value for this election year is 1.532, and the median value of form is 1.493. Almost one-fourth of these elections, however, have form coefficient values between 1.0 and 1.50; the standard deviation is 0.824. Amazingly, North Dakota is the only state that has an election in which the value for the form coefficient exceeds 3.5 (3.634). Once again, Georgia has the lowest value for a form coefficient in this election (0.098).

Figure 5.2(k) illustrates form coefficient values for the last election in the time series. As noted earlier,
the mean value for representational form (1.403), the median form values (1.281), and the standard deviation of the mean (0.644) reach their lowest points in the time series in 1986. Over 50% of elections in this year (53.6% to be exact) have form coefficient values ranging between 1.0 and 2.0. The largest value for a form coefficient in this election year is only 3.164. The coefficient for Georgia is 0.199. These low representational form coefficients indicate that at most points on the seats-votes curve, a one percent change in district partisan vote will result in only slightly more than a one percent change in partisan seat allocation in the legislature.

In addition to the figures cited above, Figures B.1 to B.41, displayed in Appendix B, provide graphic illustration of the trend toward lower representational form coefficient scores over time in each state. The vast majority of states exhibit clear declines in form over time. Only eight or nine states have rising form values. There does not seem to be strong regional patterns to these trends, although southern and border states (Oklahoma, Florida, Texas, and Virginia) may be overrepresented among the states in which representational form declines over time.

These findings generally corroborate the findings of Campagna and Grofman (1990a), King (1989), and Niemi and Jackman (1991). Some factor (or factors) is (are) causing elections to exhibit a less majoritarian pattern over time.
In fact, as noted in the above paragraphs, representational form coefficients become so low that only North Dakota has an election system in which seat changes are as responsive in the competitive range as are election systems having a "cube law" majoritarian pattern. In the next chapter, part of the discussion will center on what variables are affecting representational form in U. S. state legislative elections.

Distribution of Partisan Bias Values

As is the case with representational form values, it is possible to analyze the distribution of the partisan bias values in these state legislative elections. This section contains a description of the findings pertaining to partisan bias. A trend toward Democratic bias (or more precisely, away from Republican bias) is evident \( (r = -0.12, p < .05) \), but the correlation between bias and the "trend" variable is much weaker than the correlation between representational form and the "trend" variable. The trend for the median value of partisan bias closely follows the trend for the mean bias value.

Figure 5.3(a) shows the aggregate distribution of partisan bias for the years 1968 to 1987. As a whole, the findings for bias are similar to the direction of partisan bias found in Campagna and Grofman (1990) and Niemi and Jackman (1991). However, the findings are less similar to those of Gryski, Reed, and Elliott (1990) and King (1989).
Figure 5.3(a):
Partisan Bias, 1968-1987

Mean = 0.004  Med. = 0.035  S.D. = 0.247
Max. = 0.615 (Arizona, 1968)
Min. = -1.040 (Georgia, 1980)
Interestingly enough, my results indicate that more states have Republican biases than do other studies, with the possible exception of Niemi and Jackman (1991).

It should be noted that the bias coefficient in the logit equation measures bias as a deviation from 1.0. Thus, to put the bias coefficient in a format where Democratic bias is negative and Republican bias is positive (i.e., bias as deviation from 0), one must transform the bias coefficient produced from the estimate of Equation 3.4 by taking its antilog (exponent). After performing this transformation, one finds in Figure 5.3(a) that the mean bias for all elections is 0.004, indicating a very small bias in favor of the Republicans. The median value for bias, 0.035, illustrates a slightly larger level of Republican bias. Approximately 57% of the bias coefficients are in the Republican direction. The standard deviation for this distribution is 0.247. The largest Democratic bias for the time series is -1.040, found in Georgia in 1980. The largest bias in favor of Republicans is the 0.615 found in Arizona in 1974. Republican biases exist in 57% of the elections in the analysis and Democratic biases are found in 42% of the elections. These findings indicate that, even after controlling for representational form, Republicans tend to win more seats at any particular vote percentage than do Democrats at the same vote percentage.
Figures 5.3(b) through 5.3(k) illustrate the distribution of bias in elections in even-numbered years. The values can also be found in tabular form categorized by state and by year in Appendix C. Figure 5.3(b) shows that in the 1968 election, 61% of the elections have bias coefficients in the Republican direction, with 36% falling between 0.0 and 0.15. The mean value for bias is -0.004 and the median bias is 0.074. The standard deviation for the distribution in this year is 0.223. While over 61% of these elections have a Republican bias, the states with Democratic biases have biases of very large magnitude. The large magnitude of Democratic biases in this year and in almost every other election year accounts for the fact that mean biases are sometimes in the direction of the Democrats even though most elections have a Republican bias. For example, in 1968, Georgia produces the largest Democratic bias (-0.749); at the same time the largest Republican bias, only 0.305, occurs in Kansas.

The 1970 election is also biased toward the Republicans in most states. The mean bias is 0.018, the median bias coefficient is 0.031, and the standard deviation is 0.268. The standard deviation, the second largest in the time series, indicates that the bias toward the Republicans is not very uniform across states. As can be seen in Figure 5.3(c), two-thirds of elections in 1970 have bias parameters of between -0.15 and 0.30, but two elections
Figure 5.3(b): Partisan Bias, 1968

Figure 5.3(c): Partisan Bias, 1970

Figure 5.3(d): Partisan Bias, 1972

Figure 5.3(e): Partisan Bias, 1974
Figure 5.3(f):
Partisan Bias, 1976

Figure 5.3(g):
Partisan Bias, 1978

Figure 5.3(h):
Partisan Bias, 1980

Figure 5.3(i):
Partisan Bias, 1982
Figure 5.3(j):
Partisan Bias, 1984

Figure 5.3(k):
Partisan Bias, 1986
have Democratic biases that exceed -0.45. Another indication of the lack of uniformity of the biases in 1970 is the fact that the number of states having a Democratic bias rose from 39% in 1968 to 44% in 1970, yet the mean bias moved in the direction of the Republicans. There were four elections (as opposed to 1 in 1968) in which Republican bias exceeded 0.30; the largest of these biases -- 0.555 -- occurred in Montana. The largest Democratic bias is the -0.880 found in Georgia.

In 1972, the mean bias coefficient grows to 0.085, indicating the largest mean Republican bias found in the time series. The median bias, 0.103, is also quite large. The standard deviation is almost average, 0.241. Figure 5.3(d) illustrates that over one-third of the elections in 1972 have a bias of between 0.0 and 0.15, while another 29% have biases between 0.15 and 0.30. Overall, Republicans benefit from bias in an astounding 79% of elections in this year. There are five Republican bias values that exceed 0.30, with the largest bias existing once again in Montana (0.474). The largest Democratic bias is the -1.038 value generated in Georgia.

Figure 5.3(e) reveals that the 1974 elections (judging from the mean bias values) begins a trend toward elections becoming more biased toward the Democrats. The high levels of Republican bias produced in the 1972 elections are only slightly lower in 1974, but the trend noted above has its
genesis in this year. The mean value of bias declines to 0.075 and the standard deviation decreases dramatically to 0.218. While the median bias becomes even more biased toward the Republicans (0.108, the highest in the time series), this value will decline dramatically (as will the mean value) in 1976. Thus, this year includes elections that are uniformly biased toward the Republicans. As in 1972, the majority of elections exhibit bias coefficients ranging from 0.0 to 0.30. Fully 69% of elections are biased in favor of the Republicans. Texas is the state with the highest levels of Democratic bias (-0.532). The state with the largest Republican bias in this election is Arizona (0.615).

Bias in the 1976 election swings dramatically toward the Democrats. In fact, the mean of the biases in this year is -0.011. As in 1970, however, approximately 55% of the elections were biased toward the Republicans. Again, the median bias value, 0.037, deviates from the mean bias value due to a few elections that have extremely large Democratic biases. The standard deviation, 0.244, is close to the mean standard deviation for the time series. As can be seen in Figure 5.3(f), the majority of elections exhibit bias coefficients that fall between -0.15 and 0.30. Texas again produces a large Democratic bias of -0.598; in contrast, the largest Republican bias is the 0.440 experienced in Colorado.
In 1978, the mean bias parameter value is 0.021 and the median bias value is 0.024. The standard deviation, 0.216 is tied for the smallest for any election year in the time series. This year, therefore, produces almost uniformly high levels of Republican bias. Figure 5.4(g) shows that the Democrats receive a bias in 47% of these elections and the Republicans benefit from a bias in the other 53%. In addition, fully 73.6% of all these elections produce a bias between -0.30 and 0.15. Incidentally, this is one of the few election years in which Republican biases seem to be larger than Democratic biases. No Democratic bias exceeds -0.45, but two Republican elections produce biases larger than 0.45. The largest of the two extreme Republican biases occurs in Idaho. Texas again has the election most biased toward the Democrats (-0.405).

The 1980s are ushered in by a year of state legislative elections that resume the trend toward more mean bias in favor of the Democrats. The mean bias parameter value is -0.007 in 1980. However, this slight Democratic bias is certainly not uniform as is illustrated by the standard deviation of 0.324 (the largest in the time series). In addition, the median value of representation, 0.061, indicates that most states actually produce a bias that is moving more strongly in the direction of the Republicans. It can be seen in Figure 5.3(h) that 64% of elections have bias values ranging from -0.15 to 0.30, but there are a
large number of extreme bias values in this election. As usual, the Democratic biases are larger in magnitude than the Republican biases. The large Democratic biases, led by the -1.040 in Georgia (the largest in the time series), accounts for the fact that there is a mean Democratic bias even though Republicans are the beneficiaries of bias in 56.4% of these elections. Once again, the deviation between the mean bias and the median bias is great. The Republican bias of strongest magnitude, 0.521, is experienced in Alaska.

Figure 5.3(i) reveals the distributional pattern of bias in the 1982 elections. The mean value of the bias coefficients, -0.016, again rises in favor of the Democrats in 1982. Furthermore, the median bias, 0.009 (the one closest to zero in the time series), also registers a shift toward the Democrats. The standard deviation for the bias distribution -- 0.255 -- is still quite large. Over 60% of the elections in this year have bias parameters ranging from 0.15 to -0.15; in fact, Democrats actually benefit from bias in 49% of these elections. Once again, some Democratic values are extremely large, particularly in Georgia (-0.886). The most biased Republican election is in Alaska; the coefficient in this election is 0.530.

In 1984, the trend toward more Democratic bias is again temporarily sidetracked. The mean value of the bias parameter is 0.002 and the median value is 0.050 in this
election year. These elections produce the mean bias value that is closest to zero. The standard deviation is 0.232. Figure 5.3(j) illustrates the relative lack of bias by showing that 65% of the elections have bias values ranging from 0.15 to -0.15. In this election year, the partisan bias split in elections is 57.5% to 42.5% in favor of Republicans. While Georgia is still the state having the election most biased toward the Democrats, the coefficient in the Georgia election of 1984 is the lowest of the large Democratic biases since 1978: -0.809. In addition, the Republican bias in Alaska, 0.402, is the third smallest of the large Republican biases.

Finally, by 1986, the pro-Democratic bias trend in these elections reaches its zenith. The mean of the party bias coefficient is -0.096 and the median bias value is -0.029. The standard deviation is also tied with the 1978 standard deviation as the lowest in the time series, 0.216. As can be seen in Figure 5.3(k), 61% of 1986 elections have bias coefficients in the range of -0.15 to 0.15. Additionally, for the first time in any election year, Democrats benefit from bias in over 50% of the elections (63%, to be exact). The -0.726 produced in Georgia is the most biased toward the Democrats. The highest Republican bias, 0.312, is found in West Virginia.

Although there is a consistent Republican bias present in U. S. state legislative elections, this advantage varies
from year to year and, of course, from state to state. As noted earlier, there is a trend in bias in this time series toward the Democrats. Two other tendencies should perhaps be noted.

First, in three of the four presidential election years from 1972 to 1984, the standard deviation of the distribution of bias values has been below the mean for the time series. In addition, in these same three years, party bias has moved toward the party winning the presidency. In 1972 and 1984, two years in which Republican candidates won the presidency, there were relatively large, uniform shifts in partisan bias toward Republican state legislative candidates. If one examines the median rather than the mean values for bias, Republicans also benefitted from a shift in bias in 1980. Similarly, in 1976, there was a large, fairly uniform shift in bias toward the Democrats. These observations may suggest that national forces operated to improve the fortunes of state legislative candidates apart from any redistricting effects.

Second, there may be tentative support for the hypothesis that gerrymandering effects on partisan bias are present. The largest number of elections that immediately follow redistricting occur in 1972, 1974, 1982, and 1984. The standard deviation of the mean bias for these years is larger than average for 1970, 1980, and 1982. Furthermore, the standard deviations for elections between these
important redistricting years (1974-1978 and 1984-1986) are much lower. Such a decline in standard deviations after redistricting could indicate that redistricting does benefit the party controlling the redistricting process but that the bias benefit is short-lived. Thus, Democrats benefit from bias when they control redistricting and the opposite is true for Republican-controlled states. As the decade progresses, however, it may be that the redistricting effects decrease, thus causing the bias values of each party and the standard deviation for these election years to decline.

Figures B.1 to B.41, in Appendix B, illustrate the trends in partisan bias for each state. Approximately 60-65% of the states show clear trends in bias favoring the Democrats. Approximately 20% show trends in bias toward the Republicans. A number of states, perhaps 10-15, have irregular trends. Examples of the latter include Connecticut, Rhode Island, Texas, Virginia, Iowa, Kansas, and Wisconsin. The only regional patterns that emerge are that states in the Midwest seem to have the least clear trend pattern and states in the South seem to have trends toward even more Democratic bias in their elections. Standard deviations of these elections do decline in value over time, however, suggesting that extreme biases are becoming less commonplace (particularly for Democrats).
Returning to Table 5.1, one finds the mean values of representational form and partisan bias for each state. Aside from the aforementioned southern states, North Dakota and South Dakota have the highest mean representational form coefficients, 4.260 and 3.477, respectively. Texas (0.553) and Oklahoma (0.607) produce elections with the lowest mean value of representational form. In the aggregate (and excluding the five Deep South states), 17 of the 41 states have mean values larger than 2.0. There are 16 states in which the mean representational form value is between 1.00 and 2.00 and 8 states in which the mean representational form value is less than 1.0. Once again, the slightly majoritarian nature of the seats-votes relationship is clearly evident in these figures. However, two states other than North Dakota and South Dakota -- Indiana (3.245) and New Jersey (3.001) -- had mean representational form coefficient values that were higher than 3.00.

In general, the representational form values may well correspond to levels of district party competition. New Jersey and North Dakota, two states with high values of representational form, certainly are known as strong two-party states (Bibby, et al 1990, 92). The low values of representational form found in the southern states and in Massachusetts may well reflect the fact that Democrats tend to win by such large margins that a small shift in the
partisan vote percentage would have very little effect on the aggregate partisan distribution of seats.

In Illinois, the only non-southern state other than Massachusetts that has low representational form values, the low values do not reflect a lack of partisan competition at the state level but do, perhaps, reflect a lack of party competition at the district level. In the case of Illinois from 1968 to 1980, for example, each district was a three-member multimember district in which each voter was given three votes. The voters could cast their three ballots for the same candidate, give one vote to three different candidates, or divide their three votes among two candidates (i.e., each of the two candidates would win 1.5 votes). For tactical reasons, it was common for each party to nominate two candidates, thus ensuring that (in my transformation of multimember districts into quasi single-member districts) many seats were uncontested (Inter-university Consortium for Political and Social Research 1989, 27).

As for partisan bias, 29 states (excluding Alabama, Arkansas, and Mississippi), have a mean partisan bias in the direction of the Republicans and 12 (excluding Georgia and South Carolina) have a mean partisan bias that favors Democrats. Arizona has the largest Republican bias, 0.328. The second highest level of Republican bias is found in Alaska (0.286). Of the states with a Democratic bias,
Texas has the largest mean coefficient (-0.338) and Massachusetts has the second largest mean parameter value (-0.314).

By and large, it seems that partisan bias exists in direction and magnitude roughly in proportion to the traditional electoral strength of the parties in the various states. For example, Kentucky, Massachusetts, Oklahoma, Texas, and Hawaii, which have long been Democratic strongholds, have high levels of partisan bias in favor of the Democrats. States in which Republican candidates for national, state, and local offices tend to do well -- Colorado, Montana, Alaska, and Arizona -- are states with high levels of Republican bias.

There are some exceptions to the general rule that partisan bias tends to accompany party electoral strength in a state. West Virginia and Maryland, states generally thought to be Democratic bases, register party biases toward the Republicans (a large Republican bias in West Virginia). Likewise, Wyoming and South Dakota, two traditionally Republican states have large Democratic biases. While the reason for these four exceptions is not readily apparent, it could be the case that minority party voters waste fewer votes than voters from the majority party by electing a relatively large number of legislators in minority party districts while casting a relatively small number of votes across all districts. It may also be the
case that state legislators in the majority party do not feel the need to engage in gerrymandering since they tend to overwhelm their minority party opponents without manipulating district boundaries.

CONCLUSION

In this chapter, a description of the values of representational form and partisan bias in legislative elections in 46 U. S. states has been provided. After excluding elections from five southern states, the results indicate that when one includes uncontested elections and analyzes the seat-vote relationship between 35% and 65% of the mean Republican vote on the seats-votes curve, U. S. state legislative election systems are slightly majoritarian in nature. Most election systems are somewhat more responsive to vote changes in the middle of the seats-votes distribution than are proportional representation systems. Furthermore, there is a clear trend toward less majoritarian election outcomes over time.

In general, election systems are more majoritarian in the Northeastern states and the upper Midwest and Great Plain states and less majoritarian in the South. However, Illinois and Massachusetts are examples of non-southern state having elections with extremely low values for representational form. The findings for representational form do not deviate greatly from the results of other studies dealing with seats-votes relationships in the U. S. states.
However, my findings do tend to produce slightly lower coefficients than one finds in other studies. This slight deviation in findings is probably due to my decision to include uncontested elections in the analysis.

The generation of bias coefficient values for the states also produces some interesting results. It was found that 57% of the elections were biased toward the Republicans and 42% of elections produced Democratic biases. Translating these election results to mean levels for each state over the time series, one finds that 29 states have elections with Republican biases and 12 states have elections that are biased toward the Democrats. The magnitude of these biases varies greatly across states. Democratic biases are frequent in most southern states and are quite large in Oklahoma, Texas, and Kentucky. Large Republican biases are frequently found in western states, although West Virginia and Maine also tend to have elections with large Republican biases.

What can explain the variation in representational form and partisan bias across states and across time? Do election rules have an effect on representational form or can form patterns be explained by the partisan nature of the district-level votes? Does redistricting have an effect on the level of partisan bias or is there some other causal explanation for the patterns that are observed? These questions will be explored in Chapter Six.
NOTES

1. Partisan bias can occur at any point on the seats-votes curve. For instance, a system could be determined to be biased if Republicans won 60% of the vote and 70% of the seats while Democrats won 60% of the vote and 65% of the seats. Nonetheless, the discussion is centered on the 50% point since many researchers prefer to discuss bias at 50% of the vote distribution.


3. It should be noted that the descriptive statistics and discussions pertaining to individual election years exclude those elections that are held in odd-numbered years. To include these elections would have involved recoding the elections held in odd-numbered years in the relevant states to even-numbered years. The decision to exclude these elections in the discussion affects only four states: Alabama (only in 1984), Kentucky (until 1984), New Jersey, and Virginia (except in 1982). However, because the representational form and partisan bias values found in elections in these five states span the spectrum of possible values, there should not be a substantial impact on the descriptive statistics due to the exclusion of these elections. Furthermore, and more importantly, the elections that were excluded from the analysis of individual election years in this chapter were included in the pooled analysis described in the next chapter and in the aggregate findings reported in this chapter.
CHAPTER SIX: EXPLANATIONS OF VARIATION IN PARTISAN BIAS AND REPRESENTATIONAL FORM

In the last chapter, the discussion was centered around the distribution of representational form values and partisan bias values across states and across elections. In this chapter, I identify variables that explain variation in representational form and partisan bias coefficients in these elections. The organization of this chapter is straightforward. First, I test the model of representational form described in detail in Chapter Four. The representational form model contains variables that operationalize district party competition and election rule variables. Second, I test the partisan bias model to see if partisan control of the redistricting machinery and intent to gerrymander translate into partisan bias in the election subsequent to redistricting. Third, I provide a summary of the results in the last section of the chapter.

EXPLAINING REPRESENTATIONAL FORM

The first step in testing the representational form model is to report the simple correlations among the independent variables and between each independent variable and the dependent variable. This process is important for two reasons. First, the simple correlations between the independent and dependent variables describe the bivariate relationship between these variables. This gives the researcher a first glimpse as to whether the hypotheses he
or she has presented will hold up under stricter scientific scrutiny. In addition, if the bivariate relationships between the dependent variable and one or a few independent variables are extremely strong, the researcher may be able to produce a more parsimonious model than the original model he or she specified. Second, the simple correlations between each pair of independent variables provide the first clue as to whether or not multicollinearity may exist in the model. The simple correlations also may help the researcher decide which variable or variables to drop should it be determined that multicollinearity is a problem.

The correlation matrix in Table 6.1 contains the simple correlation coefficient (the Pearson's r statistic) for each pair of variables in the representational form model. Table 6.1 provides preliminary confirmation of the accuracy of the hypotheses mentioned in Chapter Four. The variables related to competition show strong correlations with form and are in the correct direction. In fact, the Pearson's r value for the relationships between form and the district competition variables are all significant at the .001 level.

The election rule variables are also highly correlated with representational form, but not always in the direction suggested by the hypotheses. On one hand, Taagepera's index and representational form produce a Pearson's r
Table 6.1. Correlation Matrix for the Variables in the Representational Form Model

<table>
<thead>
<tr>
<th>FORM</th>
<th>COMP</th>
<th>COMPSTAN</th>
<th>COMPSKEM</th>
<th>COMPKURT</th>
<th>MAG</th>
<th>TAAG</th>
<th>NDIST</th>
<th>NSEATS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORM</td>
<td>1.000</td>
<td>0.609</td>
<td>0.474</td>
<td>0.436</td>
<td>0.164</td>
<td>0.242</td>
<td>0.315</td>
<td>0.275</td>
</tr>
<tr>
<td>COMP</td>
<td>0.609</td>
<td>1.000</td>
<td>0.408</td>
<td>0.372</td>
<td>0.210</td>
<td>0.070</td>
<td>0.113</td>
<td>0.002</td>
</tr>
<tr>
<td>COMPSTAN</td>
<td>0.474</td>
<td>0.408</td>
<td>1.000</td>
<td>0.416</td>
<td>0.217</td>
<td>0.113</td>
<td>0.242</td>
<td>0.474</td>
</tr>
<tr>
<td>COMPSKEM</td>
<td>0.436</td>
<td>0.372</td>
<td>0.416</td>
<td>1.000</td>
<td>0.418</td>
<td>0.192</td>
<td>0.291</td>
<td>0.372</td>
</tr>
<tr>
<td>COMPKURT</td>
<td>0.164</td>
<td>0.210</td>
<td>0.217</td>
<td>0.418</td>
<td>1.000</td>
<td>0.142</td>
<td>0.217</td>
<td>0.217</td>
</tr>
<tr>
<td>MAG</td>
<td>0.242</td>
<td>0.070</td>
<td>0.113</td>
<td>0.192</td>
<td>0.142</td>
<td>1.000</td>
<td>0.291</td>
<td>0.291</td>
</tr>
<tr>
<td>TAAG</td>
<td>0.315</td>
<td>0.113</td>
<td>0.242</td>
<td>0.418</td>
<td>0.217</td>
<td>0.291</td>
<td>1.000</td>
<td>0.275</td>
</tr>
<tr>
<td>NDIST</td>
<td>0.275</td>
<td>0.002</td>
<td>0.315</td>
<td>0.417</td>
<td>0.417</td>
<td>0.417</td>
<td>0.291</td>
<td>0.164</td>
</tr>
<tr>
<td>NSEATS</td>
<td>0.275</td>
<td>0.002</td>
<td>0.315</td>
<td>0.417</td>
<td>0.417</td>
<td>0.417</td>
<td>0.291</td>
<td>0.164</td>
</tr>
<tr>
<td>COUNTER</td>
<td>0.275</td>
<td>0.002</td>
<td>0.315</td>
<td>0.417</td>
<td>0.417</td>
<td>0.417</td>
<td>0.291</td>
<td>0.164</td>
</tr>
</tbody>
</table>

*This is the Pearson correlation coefficient (the Pearson’s r) used to measure the simple correlation between the variables.*

b*This is the significance level of the Pearsons’ r.*

c*This is the number of cases used to calculate the Pearson’s r.*
of 0.242 \( (p < .001) \). Effective district magnitude is also highly correlated with representational form \( (0.124, \ p < .05) \). Additionally, the correlation between the counter variable and representational form follows the negative pattern \( (-0.275, p < .001) \) suggested by the literature. However, two other variables exhibit coefficients that indicate that the relationships between the independent variables and the dependent variable are in the opposite direction from what one might expect. Both the number of districts and the number of seats \( (-0.315 \text{ and } -0.276, \text{ respectively}) \) have correlations with representational form that are opposite of what one should expect.

Of course, simple correlations are not the final statistics of preference in measuring a relationship between variables. One must specify a model to control for the effects of other independent variables when attempting to define the precise nature of the relationships between an independent and dependent variable. Multivariate regression controls for the effects of other independent variables by providing regression coefficients to represent the covariation between each of the independent variables and the dependent variable. In other words, multivariate regression enables the researcher to measure the independent effects of each independent variable on the dependent variable. Therefore, it is necessary to use multivariate regression to test properly the hypotheses that have been
presented. Nonetheless, simple correlation coefficients do allow one to make preliminary judgments about research hypotheses.

Perhaps an even more important use for a correlation matrix is that it helps the researcher to test for collinearity among pairs of independent variables. When collinearity exists between two or more independent variables, inclusion of the affected variables in a multivariate regression model can produce t-scores that misrepresent the strength of the relationship between one or more of the independent variables and the dependent variable. This misrepresentation occurs because when independent variables that are highly correlated are used in the same regression equation, the standard errors of the variables tend to be inflated. Thus, the null hypotheses regarding collinear variables may be falsely accepted (i.e., the coefficients for these variables may not appear to be statistically significant) (See Lewis-Beck 1980, 58-63).

The correlation matrix of the independent variables (excluding the counter variable) illustrates that five pairs of independent variables exhibit correlations greater than 0.50. The 0.50 mark is a conservative figure, since multicollinearity is more commonly a problem when Pearson's r approaches 0.80. In fact, only one pair of variables has a correlation exceeding 0.80.
One of these pairs, with $r > .50$, is party competition and the interaction variable derived from the standard deviation of the Republican district vote and mean level of party competition (0.509). Since interaction terms often have high correlations with their component variables and because there are strong theoretical reasons for including the party competition interaction terms, however, the latter should not be excluded simply because they are highly correlated with another independent variable. Other independent variables are highly correlated. As expected, the number of legislative districts is highly correlated with a number of other variables. Number of districts and district magnitude produce a Pearson's $r$ of -0.538, number of districts and Taagepera's index exhibit a simple correlation of -0.818, and the correlation between number of districts and number of seats is 0.719. Another very high correlation is found to exist between district magnitude and Taagepera's index (0.763). These relationships should be taken into consideration when the model explaining representational form is created.\(^1\)

In addition, one should be aware of the dangers of using pooled data to test hypotheses. As noted in Chapter Four, one must be aware of the possible existence of heteroscedasticity and autocorrelation when pooled data are employed. Since one must control for heteroscedasticity before autocorrelation can be detected (Sayrs 1989, 19),
the dummy variable least squares (DVLS) models are compared with the OLS models first. Then, tests for autocorrelation are conducted.

For the model of representational form, tests for heteroscedasticity resulted in the finding that unit effects were present (F of 4.53 > critical value of 1.39). Subsequent tests for autocorrelation using DVLS-OLS were inconclusive (DW = 1.74; dL < DW < dU). To be on the safe side, it was decided to control for possible autocorrelation by employing GLS. Therefore, Table 6.2 reports the results using DVLS-GLS. For the sake of space, only the coefficients associated with the independent variables (and not the dummy variables) are reported whenever DVLS is employed. In addition, because inconclusive tests for autocorrelation do not require use of GLS, I will note any differences between the findings for GLS and OLS. Finally, the significance levels in the following tables are presented as one-tailed tests if the coefficients are in the hypothesized direction and as two-tailed tests if they are in the "wrong" direction.

Table 6.2 provides the results obtained from estimating the model of representational form using DVLS-GLS regression. The model as a whole explains a good bit of the variation in representational form. The adjusted R² of 0.914 is quite respectable, indicating that 91% of the variation in representational form across states and over
Table 6.2. GLS Coefficient Estimates for Representational Form (Full Model), 1968-87

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>se(^b)</th>
<th>t-score</th>
<th>prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>MComp.</td>
<td>2.647</td>
<td>0.293</td>
<td>9.049</td>
<td>0.0001***</td>
</tr>
<tr>
<td>MComp. *</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stan. Dev.</td>
<td>-4.583</td>
<td>0.720</td>
<td>-6.363</td>
<td>0.0001***</td>
</tr>
<tr>
<td>MComp *</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skew *</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>0.109</td>
<td>0.043</td>
<td>2.504</td>
<td>0.0064***</td>
</tr>
<tr>
<td>MComp. *</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kurt.</td>
<td>0.288</td>
<td>0.024</td>
<td>12.008</td>
<td>0.0001***</td>
</tr>
<tr>
<td>Mag.</td>
<td>0.246</td>
<td>0.182</td>
<td>1.356</td>
<td>0.0880'</td>
</tr>
<tr>
<td>Taag.</td>
<td>-0.226</td>
<td>0.219</td>
<td>-1.034</td>
<td>0.3017</td>
</tr>
<tr>
<td>NDist.</td>
<td>0.002</td>
<td>0.002</td>
<td>0.839</td>
<td>0.2012</td>
</tr>
<tr>
<td>NSeats</td>
<td>-0.003</td>
<td>0.003</td>
<td>-1.241</td>
<td>0.2153</td>
</tr>
<tr>
<td>Counter</td>
<td>-0.015</td>
<td>0.004</td>
<td>-4.120</td>
<td>0.0001***</td>
</tr>
</tbody>
</table>

Number of cases 398

R\(^2\) 0.914

Note: The dependent variable is the representational form coefficient of the legislative elections by state.

\*These estimates are generated using dummy-variable least squares (DVLS) regression. The variable list excludes dummies that were included for 44 states. In addition, DVLS does not require the inclusion of a constant term.

\*bIn this column, the standard errors of the coefficients are reported.

\*p < .10, one-tailed test.

\*\*p < .05, one-tailed test.

\*\*\*p < .01, one-tailed test.
time can be explained by the model. Certainly, the high $R^2$ is in part due to the inclusion of the state dummy variables.

Most of the variables are in the hypothesized direction and achieve statistical significance. The coefficients associated with the variables related to the distribution of Republican votes across districts are especially strong. The mean level of district party competition variable and the variables formed by the interaction of competition and the standard deviation, skewness, and kurtosis of the Republican district vote are all in the expected direction and significant at the least at the .01 level (one-tailed). The most intuitive hypotheses related to the effects of partisan competition on representational form are confirmed.

Rising partisan competition, particularly when accompanied by a low standard deviation among the districts in a state, results in an increase in the representational form coefficient (i.e., a more majoritarian system). Controlling for other variables, the results for the competition variable can be interpreted to mean that a change from a mean of no party competition to a mean of perfect party competition causes a 2.65 increase in the value of representational form. Considering that the largest representational form coefficient in the study was 5.38, this represents a large increase in the representational form
coefficient. To illustrate further the importance of the two partisan vote distribution variables with the highest t-scores, assume that a state went from a .40 party competition score in one election to a .60 party competition score in the next election. Assume also that the kurtosis of the Republican vote moved from -0.9 (away from district party competition) in the first election to 1.6 (toward more competition) in the second election. Holding the other variables in the study constant and assuming that the representational form coefficient was 2.00 in the first election, the second election would produce a representational form coefficient of 2.91. If the values for kurtosis had been reversed in the elections but the change in competition had been the same, the representational form in the latter election would have increased only to 2.19.

Skewness is also significant at less than the .01 level. As an example of the substantive significance of skewness, assume that Republicans were the partisans who received the highest percentage of the mean district-level vote in a state. Skewness in the direction of Republican votes at the district level would cause a .109 increase in the representational form of the election system. This increase in the majoritarian nature would occur because the majority party, the Republicans, would win more seats as the district-level vote became more favorable to them. If the Democrats were the beneficiaries of a skewed
district-level vote, then (if they were the minority party) representational form would decline by .109. The decline would be the result of the fact that the district-level vote was skewed in favor of the party that received the lowest mean district-level vote; such a phenomenon should cause the election system to become more nearly proportional in seat allocation.

The effective magnitude variable is significant at the .10 level (one-tailed). The findings suggest that if a state moved from a single-member district format to a multimember district arrangement with two members per district, representational form would increase by 0.246. The effect of effective magnitude partly explains why Indiana, New Jersey, North Dakota, and South Dakota, all of which have multimember districts in every election in the time series (and the three latter states almost exclusively so), have the highest values for representational form. In addition, the counter variable confirms that for some reason other than party competition and the election rule variables in the model, there is a significant decline (p < .001, one-tailed) in representational form over time. From one election to the next (assuming a two-year election cycle), representational form values decline by 0.030.

Three variables do not behave as expected, however. The coefficients for the Taagepera Index and for the number of seats are in the wrong direction (although the
coefficients are not significantly different than zero). The relationship between the two independent variables and representational form could also be influenced by the specification of the full model since the simple correlations between these variables and representational form reported in Table 6.1 are significant and in the hypothesized direction. Finally, although the variable for the number of districts does exhibit a positive relationship with representational form, the coefficient for this variable is not significantly different than zero.\(^3\)

Certainly, there are theoretical reasons for specifying any given model. Additionally, however, there are statistical reasons for making adjustments to the theoretical model. As noted earlier, it may be in the interest of the researcher to attempt to avoid multicollinearity and to specify a more parsimonious model by dropping one or more variables. Analyzing the correlation matrix in Table 6.1 and applying regression-based tests for multicollinearity, it was decided that the magnitude variable and the number of districts variable would be excluded from the analysis.\(^4\) It was believed that the number of districts might be having a detrimental effect on the Taagepera Index variable and the number of seats variable and that the effective magnitude variable was affecting the testing of the Taagepera Index variable.
The parsimonious model was estimated using DVLS-GLS. The F-test for DVLS, 6.68, exceeded the critical value of 1.39; thus, unit effects were present. Additionally, the Durbin-Watson statistic, 1.75, was again in the range where the test for autocorrelation was indeterminate.

In Table 6.3, the results of a more parsimonious model (from which the counter variable is excluded) are reported. Dropping effective magnitude and the number of districts variables has little impact on the party vote distribution variables. The coefficients for mean level of district party competition and the standard deviation interaction term do become a bit larger, as do the associated t-ratios. The coefficients for the skewness and kurtosis interaction variables remain virtually identical. Thus, the four party competition variable coefficients do not change direction and the significance levels remain unchanged.

As expected, the election rule variable coefficients and significance levels change somewhat when effective magnitude and the number of districts variables are excluded from the model. The coefficient associated with the number of seats variable, which had been negative in the full model, does take on a positive value in accordance with the hypothesis. However, the coefficient and the t-ratio of the number of seats variable remains small and the variable does not achieve statistical significance.
Table 6.3. GLS Coefficient Estimates for Representational Form (Parsimonious Model), 1966-87

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>se&lt;sup&gt;b&lt;/sup&gt;</th>
<th>t-score</th>
<th>prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>MComp.</td>
<td>2.985</td>
<td>0.283</td>
<td>10.564</td>
<td>0.0001***</td>
</tr>
<tr>
<td>MComp. *</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stan. Dev.</td>
<td>-5.758</td>
<td>0.664</td>
<td>-8.665</td>
<td>0.0001***</td>
</tr>
<tr>
<td>MComp *</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skew *</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>0.110</td>
<td>0.044</td>
<td>2.476</td>
<td>0.0069***</td>
</tr>
<tr>
<td>MComp *</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kurt.</td>
<td>0.290</td>
<td>0.024</td>
<td>11.896</td>
<td>0.0001***</td>
</tr>
<tr>
<td>Taag</td>
<td>0.105</td>
<td>0.071</td>
<td>1.477</td>
<td>0.0703*</td>
</tr>
<tr>
<td>NSeats</td>
<td>0.001</td>
<td>0.002</td>
<td>0.683</td>
<td>0.2474</td>
</tr>
</tbody>
</table>

Number of cases 398

R<sup>2</sup> 0.909

Note: The dependent variable is the representational form coefficient of the legislative elections by state.

*These estimates are generated using dummy-variable least squares (DVLS) regression. The variable list excludes dummies that were included for 44 states. In addition, DVLS does not require the inclusion of a constant term.

<sup>b</sup>In this column, the standard errors of the coefficients are reported.

<sup>*p < .10, one-tailed test.</sup>

<sup>**p < .05, one-tailed test.</sup>

<sup>***p < .01, one-tailed test.</sup>
It is the Taagepera Index variable that changes dramatically in the parsimonious model. The coefficient becomes positively related to representational form (as was hypothesized) and the standard error of the coefficient decreases to the point that the variable becomes significant at the < .10 level, one-tailed. The substantive strength of the Taagepera Index shows that as the log of voters increases by one with respect to the log of districts in a state, the representational form value will increase by 0.105. The effect of the Taagepera Index variable provides some explanation as to why Alaska, with approximately 300,000 voters in 19-27 districts (Taagepera Index of 3.8-4.5), has representational form values in the 2.0-3.5 range while Kansas, with approximately 775,000 voters in 125 districts (Taagepera Index of 2.8), has representational form values in the 1.5 to 2.5 range.

The adjusted $R^2$ of the parsimonious model declines negligibly (from .914 to .909) when the three variables from the full model are excluded. Inclusion of the counter variable back into the model might provide some useful information, however. First, one could test to see if any of the independent variables are weakened by the addition of a counter variable. If not, then the independent variables do have a nonspurious correlation with the dependent variable. Second, if a counter variable still has an effect on the dependent variable, then the researcher may
have a clue as to other variables that may be affecting the dependent variable over time. If the counter variable coefficient is negative, for example, the researcher can test the effects on the dependent variable of a variable that is known to be declining over time.

Addition of the counter variable to the parsimonious model once again requires the use of DVLS-GLS. Heteroscedasticity was present in the OLS estimates; the $F$, 7.39, once again exceeded the critical value of 1.39. The test for autocorrelation again proved to be inconclusive as the Durbin-Watson statistic, 1.75, fell between the upper and lower bound values. To be on the safe side, GLS was used to control for any possible autocorrelation.

The results for the parsimonious model with the counter variable are presented in Table 6.4. The adjusted $R^2$ for the model increases to .914. Such a small increase in adjusted $R^2$ indicates that the variables in the model already account for a great deal of the variation in representational form across states and over time.

To be sure, some of the variables in the model do experience declining coefficients after the counter variable is added. However, only the coefficient for the Taagepera Index, which reached the .10 level of statistical significance in the equation in which the counter variable was dropped, loses statistical significance. Since there are only tenuous theoretical reasons for including a
Table 6.4. GLS Coefficient Estimates for Representational Form (Parsimonious Model With Counter), 1968-87

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>se(^b)</th>
<th>t-score</th>
<th>prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>MComp.</td>
<td>2.604</td>
<td>0.290</td>
<td>8.972</td>
<td>0.0001***</td>
</tr>
<tr>
<td>MComp. *</td>
<td>-4.482</td>
<td>0.716</td>
<td>-6.261</td>
<td>0.0001***</td>
</tr>
<tr>
<td>Stan. Dev.</td>
<td>0.111</td>
<td>0.043</td>
<td>2.560</td>
<td>0.0055***</td>
</tr>
<tr>
<td>MComp. *</td>
<td>0.289</td>
<td>0.024</td>
<td>12.137</td>
<td>0.0001***</td>
</tr>
<tr>
<td>Kurt.</td>
<td>0.014</td>
<td>0.073</td>
<td>0.197</td>
<td>0.4220</td>
</tr>
<tr>
<td>Taag.</td>
<td>-0.001</td>
<td>0.002</td>
<td>-0.534</td>
<td>0.5936</td>
</tr>
<tr>
<td>NSeats</td>
<td>-0.015</td>
<td>0.004</td>
<td>-4.203</td>
<td>0.0001**</td>
</tr>
</tbody>
</table>

Number of cases 398  
R\(^2\) 0.914

**Note:** The dependent variable is the representational form coefficient of the legislative elections by state.

*These estimates are generated using dummy-variable least squares (DVLS) regression. The variable list excludes dummies that were included for 44 states. In addition, DVLS does not require the inclusion of a constant term.

*In this column, the standard errors of the coefficients are reported.

*p < .10, one-tailed test.

**p < .05, one-tailed test.

***p < .01, one-tailed test.
counter variable in the model, the importance of the Taagepera Index as a theoretically meaningful (and statistically significant) variable is not diminished by this finding. Finally, the counter variable coefficient, -0.015, is significant at the .0001 level (one-tailed).8

An example using the range of values for the independent variables may be helpful in demonstrating the substantive strength of the explanatory variables. In turn, the minimum and maximum values for each independent variable will be substituted holding each of the other variables at their mean values. In this way, one can identify the range of representational form values given the range of values for each independent variable. Thus, the substantive impact of each explanatory variable can be assessed.

For this purpose, the counter variable is excluded since the concern is for a particular election at a point in time rather than as one election in a sequence of elections. The parsimonious equation without a counter variable is:

\[
\text{FORM} = a_1 + b_1 \text{COMP} + b_2 (\text{COMP}) \ast (\text{STANDEV}) \\
+ b_3 (\text{COMP}) \ast (\text{SKEW}) \ast (\text{CONTROL}) \\
+ b_4 (\text{COMP}) \ast (\text{KURT}) + b_5 \text{TAAG} + b_6 \text{NSEATS} + e
\]  

As an example of this process, one can apply the coefficients in Table 6.3 to the values for the independent variables. Then, one substitutes the minimum (0.293) and maximum (1.00) values for COMP (in this case),
respectively, and the mean values for the other independent variables into two equations:

\[
\begin{align*}
\text{FORM} &= 0.562 + (2.985)(0.293) \\
&\quad - (5.758)(0.293)(0.253) \\
&\quad + (0.110)(0.293)(0.105)(-1) \\
&\quad + (0.290)(0.293)(0.307) + (0.105)(3.338) \\
&\quad + (0.001)(110.664) \\
&= 0.562 + 0.875 - 0.427 - 0.003 + 0.026 + 0.350 + 0.111 - 1.494.
\end{align*}
\]

\[
\begin{align*}
\text{FORM} &= 0.562 + (2.985)(1.00) \\
&\quad - (5.758)(1.00)(0.253) \\
&\quad + (0.110)(1.00)(0.105)(-1) \\
&\quad + (0.290)(1.00)(0.307) + (0.105)(3.338) \\
&\quad + (0.001)(110.664) \\
&= 0.562 + 2.985 - 1.457 - 0.012 + 0.089 + 0.350 + 0.111 - 2.628.
\end{align*}
\]

In this case the predicted value for party representational form at the maximum level of mean district party competition is 2.628. The predicted value for form given the minimum level of mean district party competition is 1.494. The difference in these two values, 1.134, represents the range of possible effects on representational form values of district level competition while holding constant the effects of the other independent variables.

Following the previously noted technique, I find the following range of effects on representational form of each
independent variable: (a) mean district party competition, 1.134; (b) competition-standard deviation interaction term, 1.600; (c) competition-skewness interaction term, 0.382; (d) competition-kurtosis interaction term, 2.330; (e) Taagepera’s Index, 0.259; (f) Number of seats, 0.362.

As can be observed, the values for mean level of competition, the competition-standard deviation interaction term, and the competition-kurtosis interaction term are all quite strong in relation to the values produced by the other variables. The large values observed in this illustration combined with the extremely large values of the coefficients in Table 6.3 lead one to conclude that the mean level of district partisan competition, the competition-standard deviation interaction term, and the competition-kurtosis interaction term have strong substantive impacts on representational form.

The other three variables have much weaker effects on representational form. The competition-skewness interaction term and Taagepera’s Index, which reach statistical significance in Table 6.3, have a relatively trivial impact on representational form. The effect of the number of seats, 0.362, is even larger than the substantive impact of Taagepera’s Index and is only slightly smaller than the substantive effect of the competition-skewness interaction term.
To summarize this section on representational form, one can state that the variables associated with party competition have a strong effect on the dependent variable. Tables 6.2 through 6.4 show that the competition variables are significant and in the expected direction. Three of these variables, mean district party competition, the competition-standard deviation interaction term, and the competition-kurtosis interaction term have strong substantive impacts on representational form, as well. It does seem to be the case that the higher the level of party competition at the district level and the more districts that fall into the competitive range, the more majoritarian is the election system.

Election rule variables are less effective in explaining variation in representational form than are party competition variables. The Taagepera Index and the effective magnitude variables do achieve the most liberal level of statistical significance, suggesting that election systems that have a large number of voters per district and have multimember districts may be associated with slightly more majoritarian patterns than other systems. However, the findings for effective magnitude may be a statistical artifact, since effective magnitude is highly correlated with Taagepera's Index and the number of districts variable. Finally, none of the election rule variables have
the substantive impact on representational form that the party competition variables have.

As was noted at the beginning of the chapter, there is a definite trend toward less responsive elections over time. Inclusion of a counter variable in the above equations illustrates that a large trend toward less responsive elections still exists after controlling for the effects of all the other independent variables. In fact, the counter variable achieves statistical significance at the .0001 level (one-tailed). Nonetheless, including the counter variable adds very little to the R² of any equation in which it is added. Furthermore, the party competition variables are almost unaffected by the inclusion of the counter variable. Only Taagepera's Index seems to be greatly affected by the use of a counter variable.

The results as a whole suggest that representational form in state legislative elections is closely associated with the distribution of partisan votes across election districts. As party competition becomes more prevalent at the district-level, the state election system becomes more majoritarian in nature. This dissertation does not include an examination of the factors that might increase partisan competition. However, it is clear that whatever leads to greater party competition in a larger number of districts will cause state election systems to have a more majoritarian and less proportional form of democratic
representation. Additionally, assuming a constant level of party competition across districts, the larger the size of the election districts in terms of population the more majoritarian will be the seats-votes pattern.

EXPLAINING PARTISAN BIAS

In this section, the results of regression equations used to explain variation in partisan bias are examined. As was noted in a previous chapter, I have hypothesized that party control of redistricting will determine partisan bias. To measure this phenomenon, a variable is created for each year, coded "1" if redistricting occurred in that year and "0" otherwise. Next, a variable is created which is coded "1" for a Republican-controlled redistricting, "-1" for a Democratic-controlled redistricting, and "0" for all others. These two variables are then multiplied to produce an interaction term. Next, the natural log of bias is regressed on the interaction term for each election year. Since the natural log of bias is coded in such a way that positive values reflect a Republican bias, one may expect that there should be a positive relationship between bias and each party redistricting/election year interaction term. Of course, only those elections having variation in the interaction term variable (i.e., having at least two types of redistrictings in a single year) are included in the analysis. Finally, a dummy variable for each of the years in which redistrictings are analyzed is included in
the equation so that the mean bias for the elections coded "0" vary with each election.

Table 6.5 shows the results of the analysis using OLS regression. As one can see, the coefficient for each election year except 1972 is in the correct direction. However, most of these coefficients are quite small. In only 1970, 1976, and 1982 do the party redistricting coefficients reach statistical significance. In 1970, the coefficient is significant at the .10 level (one-tailed). In 1976, the coefficient reaches the .01 level of statistical significance (one-tailed). In 1982, the coefficient is significant at < .05 (one-tailed). In 1978 and 1983, the coefficients are also quite large. However, probably due to the small numbers of redistrictings that occurred in these years, large standard errors associated with the coefficients prevent these variables from achieving statistical significance.

It is interesting to observe the effects of the 1972 and 1982 redistrictings. These are the two election years in which the most redistrictings occurred. To be specific, in 1972 there were 33 elections held after redistrictings, and in 1982 there were 32 states that had elections immediately following redistrictings. The next highest number of elections held in a year after redistricting took place was 16 in 1974. The results suggest that the 1972 redistricting had virtually no effect on partisan bias. In
Table 6.5. Coefficient Estimates for Partisan Bias, 1970-84

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>se*</th>
<th>t-score</th>
<th>prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.005</td>
<td>0.012</td>
<td>0.379</td>
<td>0.7046</td>
</tr>
<tr>
<td>Inter70</td>
<td>0.373</td>
<td>0.246</td>
<td>1.519</td>
<td>0.0648*</td>
</tr>
<tr>
<td>Inter72</td>
<td>-0.032</td>
<td>0.061</td>
<td>-0.525</td>
<td>0.6000</td>
</tr>
<tr>
<td>Inter73</td>
<td>0.037</td>
<td>0.174</td>
<td>0.212</td>
<td>0.4163</td>
</tr>
<tr>
<td>Inter74</td>
<td>0.008</td>
<td>0.093</td>
<td>0.085</td>
<td>0.4662</td>
</tr>
<tr>
<td>Inter76</td>
<td>0.358</td>
<td>0.142</td>
<td>2.531</td>
<td>0.0059***</td>
</tr>
<tr>
<td>Inter78</td>
<td>0.237</td>
<td>0.246</td>
<td>0.964</td>
<td>0.1679</td>
</tr>
<tr>
<td>Inter82</td>
<td>0.110</td>
<td>0.056</td>
<td>1.956</td>
<td>0.0256**</td>
</tr>
<tr>
<td>Inter83</td>
<td>0.126</td>
<td>0.174</td>
<td>0.725</td>
<td>0.2345</td>
</tr>
<tr>
<td>Inter84</td>
<td>0.003</td>
<td>0.082</td>
<td>0.035</td>
<td>0.4861</td>
</tr>
</tbody>
</table>

Number of cases 417

Note: The dependent variable is the partisan bias coefficient of the legislative elections by state.

*In this column, the standard errors of the coefficients are reported.

*p < .10, one-tailed test.

**p < .05, one-tailed test.

***p < .01, one-tailed test.
fact, the coefficient is in the opposite direction from what was hypothesized. In 1982, however, there is a strong, positive redistricting effect that is significant at the .05 level (one-tailed).

Table 6.6 contains another illustration of the findings pertaining to the redistrictings of 1976 and 1982. The coefficients indicate what the predicted log of bias would be in the particular year given nonpartisan or bipartisan redistricting, Democratic redistricting, and Republican redistricting. For both election years, the predicted mean partisan bias in elections having a nonpartisan or bipartisan redistricting is 0.005 (indicating a very slight Republican bias). The predicted mean partisan bias in Republican-controlled elections in 1976 is 0.363; alternatively, a Democratic redistricting produces a predicted bias value of -0.353. There is quite a large change in the predicted value of bias according to partisan control and intent to engage in gerrymandering in 1976. Partisan control of redistricting in 1982 produces substantive findings that are somewhat weaker than in 1976. In 1982, a movement of one unit in the Republican (Democratic) direction of control of redistricting increases (decreases) the log of partisan bias by .110.

What accounts for the bias pattern found in these election years? Because most legislative redistrictings take place after the decennial census, it could well be the
<table>
<thead>
<tr>
<th>Year</th>
<th>1976</th>
<th>1982</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Party Control of Redistricting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Democratic</td>
<td>-0.353</td>
<td>-0.105</td>
</tr>
<tr>
<td>Bipartisan/Nonpartisan</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Republican</td>
<td>0.363</td>
<td>0.115</td>
</tr>
</tbody>
</table>
case that the dominant party can take advantage of the routine redistricting process to obtain a partisan advantage in the drawing of district boundaries. It seems, however, that gerrymandering was prevalent in 1982 but not in 1972.

On the contrary, reapportionment in years other than 1972 and 1982 often occur because of legal challenges to redistricting plans that were drawn after the census (i.e., in 1972 and 1982). These other reapportionment plans are particularly likely to be scrutinized by the courts for racial discrimination or, in the 1980s, for obvious partisan bias. Certainly, if the nondecennial redistricting plans are ordered by the courts in the first place, it would seem that a party would be less able to participate in blatant gerrymandering. Generally, the results support this theory, although the elections of 1970 and 1976 are exceptions to the rule.

Another way to illustrate the effects of redistricting on partisan bias is presented in Tables 6.7 through 6.10 using data from 1972, 1974, 1976, 1982, and 1984. Table 6.7 shows actual (rather than predicted) mean bias for the given election year, mean bias in the previous election, and the mean change in party bias for four categories of states. The first set of figures are for states having Democratic control of redistricting. Table 6.8 provides the same figures for the states in which Republicans
### Table 6.7. Mean Changes in Partisan Bias, by Year and Democratic Control of Redistricting

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean Bias</th>
<th>Mean Bias at t - 1</th>
<th>Mean Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>0.1480</td>
<td>0.1031</td>
<td>0.0449</td>
</tr>
<tr>
<td></td>
<td>(10)</td>
<td></td>
<td>(10)</td>
</tr>
<tr>
<td>1974</td>
<td>-0.0120</td>
<td>0.1515</td>
<td>-0.1635</td>
</tr>
<tr>
<td></td>
<td>(6)</td>
<td></td>
<td>(6)</td>
</tr>
<tr>
<td>1976</td>
<td>-0.5980</td>
<td>-0.5315</td>
<td>-0.0665</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>1982</td>
<td>-0.1218</td>
<td>-0.1298</td>
<td>0.0080</td>
</tr>
<tr>
<td></td>
<td>(12)</td>
<td></td>
<td>(12)</td>
</tr>
<tr>
<td>1984</td>
<td>0.0457</td>
<td>0.0085</td>
<td>0.0372</td>
</tr>
<tr>
<td></td>
<td>(7)</td>
<td></td>
<td>(7)</td>
</tr>
</tbody>
</table>

*The numbers in parentheses are the numbers of elections on which the mean bias figures are based.

### Table 6.8. Mean Changes in Partisan Bias, by Year and Republican Control of Redistricting

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean Bias</th>
<th>Mean Bias at t - 1</th>
<th>Mean Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>0.1577</td>
<td>0.0683</td>
<td>0.0894</td>
</tr>
<tr>
<td></td>
<td>(6)</td>
<td></td>
<td>(6)</td>
</tr>
<tr>
<td>1974</td>
<td>-0.0400</td>
<td>0.0657</td>
<td>-0.1057</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>1976</td>
<td>0.2411</td>
<td>0.2874</td>
<td>-0.0464</td>
</tr>
<tr>
<td></td>
<td>(2)</td>
<td></td>
<td>(2)</td>
</tr>
<tr>
<td>1982</td>
<td>0.0870</td>
<td>0.0560</td>
<td>0.0310</td>
</tr>
<tr>
<td></td>
<td>(7)</td>
<td></td>
<td>(7)</td>
</tr>
<tr>
<td>1984</td>
<td>0.1614</td>
<td>0.3049</td>
<td>-0.1435</td>
</tr>
<tr>
<td></td>
<td>(2)</td>
<td></td>
<td>(2)</td>
</tr>
</tbody>
</table>
Table 6.9. Mean Changes in Partisan Bias, by Year and Bipartisan or Nonpartisan Control of Redistricting

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean Bias</th>
<th>Mean Bias at t - 1</th>
<th>Mean Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>0.0059 (15)*</td>
<td>-0.0837 (15)</td>
<td>0.0896 (15)</td>
</tr>
<tr>
<td>1974</td>
<td>0.0970 (8)</td>
<td>0.1665 (9)</td>
<td>-0.0695 (8)</td>
</tr>
<tr>
<td>1976</td>
<td>0.1500 (1)</td>
<td>0.1330 (1)</td>
<td>0.0170 (1)</td>
</tr>
<tr>
<td>1982</td>
<td>0.0290 (12)</td>
<td>-0.0089 (12)</td>
<td>0.0379 (12)</td>
</tr>
<tr>
<td>1984</td>
<td>0.0490 (4)</td>
<td>-0.0616 (4)</td>
<td>0.1105 (4)</td>
</tr>
</tbody>
</table>

Table 6.10. Mean Changes in Partisan Bias, by Year and with No Redistricting

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean Bias</th>
<th>Mean Bias at t - 1</th>
<th>Mean Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>0.0996 (7)</td>
<td>0.0320 (7)</td>
<td>0.0677 (7)</td>
</tr>
<tr>
<td>1974</td>
<td>0.0938 (24)</td>
<td>0.0930 (24)</td>
<td>0.0008 (24)</td>
</tr>
<tr>
<td>1976</td>
<td>-0.0129 (34)</td>
<td>0.0774 (34)</td>
<td>-0.0903 (34)</td>
</tr>
<tr>
<td>1982</td>
<td>-0.0158 (10)</td>
<td>0.1108 (10)</td>
<td>-0.1266 (10)</td>
</tr>
<tr>
<td>1984</td>
<td>-0.0284 (27)</td>
<td>-0.0494 (27)</td>
<td>0.0210 (27)</td>
</tr>
</tbody>
</table>

*The numbers in parentheses are the numbers of elections on which the mean bias figures are based.
controlled redistricting. Tables 6.9 and 6.10, respectively, are for states that were redistricted with bipartisan or nonpartisan plans and states that did not redistrict.

Column one of Table 6.7 through 6.10 illustrates that in most cases the mean bias is at levels and in the direction one should expect. This is particularly true in the election years after 1974. For example, the -0.1218 bias for Democratic states in 1982 is large and in the expected direction. The bias in Republican redistricted states is smaller (0.0870) but is in the hypothesized direction. The mean biases in 1982 are negligible in bipartisan and nonpartisan redistricted states and states that did not redistrict. Therefore, as expected, the biases in elections in states that had bipartisan/nonpartisan redistricting or no redistricting fall between the magnitude and direction of the biases in states that experienced partisan redistrictings in 1982. Except for states controlled by Republicans in 1972, states that had bipartisan/nonpartisan redistrictings in 1974, and nonredistricted states in 1974, the mean biases for these election years occur with the strength and in the direction one would expect.

However, the most important tale is told in the third column of Tables 6.7 through 6.10. In this column, one can observe the mean change in partisan bias from the last election before redistricting to the election immediately
following redistricting. The findings in column three suggest that, in the major redistricting years, strong changes in bias do not occur as one might expect.

In 1972, Democratic redistricting resulted in a slight increase in Republican bias. Furthermore, a bipartisan or nonpartisan redistricting resulted in a slightly larger increase in Republican bias than did Republican redistricting. In 1974, Democratic redistricting did result in a large increase in the magnitude of Democratic bias, but Republican control of redistricting also resulted in a large increase in Democratic bias. In 1984, party redistricting resulted in gains to the party that did not control redistricting.

Only in 1976 and 1982 were there effects of redistricting on bias that were in line with the gerrymandering hypothesis. In 1976, states that did not experience redistricting and states that were redistricted by the Democrats both had large increases in Democratic bias. In Republican redistricted states there were also increases in Democratic bias; however, the increases of Democratic bias in these states was much smaller than in states that did not redistrict or in which Democrats controlled redistricting. In 1982, there were also redistricting effects on bias. Republican redistricting resulted in an increase in Republican bias, but Democratic redistricting had virtually no effect on bias. However, it might be noted that states
that did not redistrict experienced an inexplicably large increase in Democratic bias while states that had bipartisan or nonpartisan redistricting had an increase in Republican bias. In short, even in the years in which the hypothesis concerning gerrymandering seems to be supported one must mention caveats.

If one looks closer at the movement of the mean levels of bias after controlling for party control of redistricting, there seems to be a pattern that suggests that national political forces could be dominating the model. In all the years in Table 6.7 except 1982, the party that benefits from presidential coattails or from the lack of presidential coattails in off-year elections also receives the benefit of a gain in bias in state legislative elections. This pattern is true for all categories of states in 1972 (Republican national forces), for the 15 states that redistricted in 1974 (Democratic national forces), for all states except the one state that experienced a bipartisan or nonpartisan redistricting in 1976 (Democratic national forces), and for all categories of states except Republican redistricted states in 1984. In addition, in 1984, it may be that Republicans simply could not keep their previous bias of .3049; the Republican bias of 0.1614 in 1984 is still one of the largest bias values in the time series.
To summarize the findings concerning partisan bias, control of the redistricting machinery does result in an increase in partisan bias on most occasions (see Table 6.5), but these increases are usually quite small. The evidence presented in Tables 6.5, 6.7, 6.8, 6.9, and 6.10 shows that any large redistricting effects on partisan bias seem to be sporadic. Some evidence of gerrymandering does exist for 1970, 1976, and 1982, but for other years there is little evidence of a correlation between partisan control of redistricting and partisan bias in the seats-votes relationship.

In general, these results deviate from the findings of Niemi and Jackman (1991, Table 4) that gerrymandering as a result of party control of redistricting is more prevalent in the 1970s than in the 1980s. However, the results of the present analysis may correspond more closely to the suggestion made by Niemi and Jackman that protection of incumbents has been the primary goal (or at least one of the major goals) of state legislators all along (1991, 199). After all, tampering with legislative district boundaries to gain partisan advantage yields more uncertainty than ensuring the safety of all incumbents. "As in Congress, preservation [emphasis mine] of partisan advantage by minimizing rates of responsiveness, rather than its creation via partisan gerrymandering, may now be the greater concern (Niemi and Jackman, 1990, 20)."
Furthermore, the data in Tables 6.7 to 6.10 suggest that if there were attempts to use the redistricting machinery to partisan advantage, forces that affected the fortunes of the national political party also had an impact on state legislative party candidates. It could be the case that attempts to gerrymander are thwarted as voters respond in state legislative elections to the appeal of candidates for president and/or Congress. The data from Tables 6.7 through 6.10 may indicate that gerrymandering and national political forces operate simultaneously.

For example, in 1972 Republican bias increased in both Democratic and Republican redistricted states, and the same thing happened to the Democrats in 1974 and 1976. However, in 1972, Republican gains in bias were larger in Republican redistricted states than in states in which the Democrats controlled redistricting. Democratic bias gains were larger in states in which Democrats controlled redistricting than in Republican controlled states in 1974 and 1976. Furthermore, Republicans benefitted from the Reagan landslide in 1984 in all states except states in which Republicans controlled redistricting; however, the latter already had tremendous levels of Republican bias before 1984. Thus, while redistricting does have a small effect on bias in many election years, these effects tend to be offset or enhanced by partisan tides in presidential and congressional elections.
CONCLUSION

In this chapter I have tested the models of representational form and partisan bias that were discussed in Chapter Four. The results of the analyses have led to the tentative acceptance and the rejection of some of the hypotheses that have been advanced in this dissertation. The results for the two models can be briefly summarized.

Representational form in U. S. state election systems was found to be a function of the partisan distribution of votes at the district level. Though a number of characteristics of the partisan vote distribution were found to be significantly correlated with representational form, three variables exhibited especially strong substantive effects on representational form. Party competition at the district level was found to have a strong, positive impact on representational form. In addition, the interaction of party competition and the standard deviation of mean district Republican vote had a strong, negative effect on representational form. The findings for the party competition variable and the standard deviation interaction term suggest that as party competition increases across a large number of districts the state election system takes on a more majoritarian (i.e., less proportional) pattern. In a state with a great deal of party competition across districts, a small shift in the partisan percentages of the
votes will result in a large shift in party control of legislative seats.

The skewness variable also has an impact on representational form. When competition is controlled and the mean district vote is skewed toward the party that already wins the most votes, the representational form coefficient increases in value. Alternatively, when mean district vote is skewed toward the losing party, the form coefficient decreases.

Finally, the kurtosis variable has a strong, positive effect on representational form. When mean district party competition is growing and more districts fall toward the mean rather than into the tails of the distribution, representational form will increase. When mean district party competition is increasing but a large number of districts fall into the tails of the distribution of the districts, a number of districts will not be in the competitive range and representational form will decline.

Election rule variables are less effective in explaining the form of democratic representation in a state’s election system. However, after controlling for the distribution of the partisan vote, some election rule variables do have a small effect on representational form. Depending on the exact specification of the model, elections with more seats per district (i.e., higher effective magnitude) and elections having large election districts by
population produced higher values for representational form than did elections with fewer seats per district and elections with districts in which there was low voter turnout, respectively. The election rule findings suggest that, barring a change in the partisan distribution of the district-level vote, an increase in the size of districts or an increase in the number of seats per district would produce a less proportional (and more majoritarian) relationship between party vote and partisan seat allocation in the legislature.

The results for the party bias model indicated that redistricting does have a small impact on partisan bias. The coefficients for the election variables suggest, however, that the effect of redistricting is sporadic and is not strong enough to warrant undue concern about partisan gerrymandering. Only in 1970, 1976, and 1982 is there evidence of the effects of gerrymandering. The findings seem to indicate that partisan bias may result from a natural dispersion of partisan identifiers across districts and from presidential and congressional coattails. By and large, Republican-dominated states tend to provide Republicans with higher levels of partisan bias and Democratic-dominated states seem to have Democratic bias or small Republican bias. Parties in control of the redistricting machinery do not seem to use redistricting to their advantage. It may well be that after the 1960s, concern about
judicial intervention and concern about the safety of the districts of incumbents from the respective parties led to a more status-quo oriented or "sweetheart" arrangement where blatant attempts to achieve partisan advantage were eschewed.

In the next chapter, I will provide a conclusion to this dissertation. I will reiterate the importance of the topic, discuss the hypotheses and the models, and restate the basic findings. Finally, I will share what I believe to be the questions that remain unanswered by the dissertation and the new questions that arise as a result of the dissertation.
NOTES

1. Another test for multicollinearity is to regress one independent variable on all the others. This test is better than the correlational test because the regression test allows the researcher to identify an independent variable that is highly related to a combination of independent variables. If the $R^2$ of regression equation is high, then multicollinearity is a possibility. The correlational test, of course, allows one to test exclusively bivariate relationships. A regression test is performed on the independent variables; the results are included later in the chapter.

2. Another way of testing the effect of an interaction term is to compare the sum of squared residuals of the regression equation with the sum of squared residuals of a regression equation in which the interaction term is dropped. One performs an F-test to determine if there is a significant decline in the sum of squared residuals after the interaction term is placed back in the model. After performing such a test on each of the party competition variables, it was discovered that the F's of each of these variables exceeded the critical F value (upper 5%) of 3.84.

3. There are some minor differences between two coefficients depending on whether one uses DVLS-GLS or DVLS-OLS regression. Using DVLS-GLS, the CONSKEW coefficient is 0.109 with a significance at < .01, one-tailed. If one uses DVLS-OLS, the same coefficient is slightly weaker (0.103) and is significant only at < .05, one-tailed. Of even more significance is the difference between the coefficient for effective magnitude (MAG). The DVLS-GLS coefficient, 0.246, is significant at the .10 level, one-tailed. The DVLS-OLS coefficient for MAG, 0.194, is not statistically significant. It should also be noted that while almost all the coefficients are slightly affected when the COUNTER variable is dropped from the model (most see a slight increase in the t-ratio), the significance levels are not greatly affected and the $R^2$ is virtually the same.

4. The $R^2$ for each regression equation in which each independent variable is regressed on all other independent variables represents the extent to which the variable that is regressed is a linear function of the other variables. In essence, each independent variable becomes a dependent variable in this procedure. The $R^2$ associated with each "dependent" variable is as follows: Party competition, 0.664; standard deviation of mean Republican district vote
interaction term, 0.672; skewness of mean Republican district vote interaction term, 0.331; kurtosis of mean Republican district vote interaction term, 0.502; effective magnitude, 0.894; Taagepera’s Index, 0.876; number of districts, 0.883; number of seats, 0.879; counter, 0.144.

When the variables with the two highest R²'s, effective magnitude and number of districts are dropped from the model, the new R²'s for each variable are as follows: Party competition, 0.627; standard deviation of mean Republican district vote interaction term, 0.642; skewness of mean Republican district vote interaction term, 0.323; kurtosis of mean Republican district vote interaction term, 0.452; Taagepera’s Index, 0.287; number of seats, 0.301; counter, 0.142.

5. F-tests on the interaction terms once again reveal that each of the party competition variables are statistically significant.

6. Using DVLS-OLS, the coefficient for CONSKEW, 0.104 (p < .05, one-tailed), was slightly weaker than when DVLS-GLS was used. No other variables exhibited any dramatic differences in the magnitude or significance levels of their coefficients.

7. All the F’s for the interaction terms still exceed the critical value of 3.84. Thus, the statistical significance of the party competition variables are not artifacts of the fact that they are interaction terms.

8. For this particular model, there would have been virtually no difference in the value or the significance level of any of the coefficients if DVLS-OLS rather than DVLS-GLS would have been used as the estimation technique.

9. The coefficients and significance levels of the independent variables change only minimally when a counter variable is added to this model. However, the coefficient for the counter variable, -0.005, is significant at the .05 level (two-tailed). This variable suggests that there is a nontrivial trend toward Democratic bias in state legislative elections after controlling for partisan redistricting.

10. Except for 1976, these years were chosen simply because they contain far more redistrictings than do other election years. The year 1976 was included because redistricting seems to have a significant effect on partisan bias in elections for this year.
In Chapter Six, I used models to test my hypotheses pertaining to representational form and partisan bias. The results of these tests indicated that the distribution of partisan votes across districts is strongly related to the representational form of an election system. Some election rule variables were found to have small but nontrivial effects on representational form. It was also found that partisan bias is affected by partisan attempts to gerrymander in some election years; however, gerrymandering was only a significant determinant of partisan bias in three election years.

For purposes of practical politics, the findings suggest that there is a slightly majoritarian pattern present in U. S. state election systems. To increase the responsiveness of seat changes to vote changes, the most important change that must occur is that minority parties in each state must become more competitive at the district level. Minority parties in the states must attract stronger challengers in state legislative elections and increase the amount of money and campaign support that their candidates receive. A more responsive system in the competitive range of seat-vote distributions could also be produced if election districts were made larger in terms of population (or an increase in voter turnout) and/or if there were a move toward more multimember districts.
However, as indicated in Table 6.1, the trend over the last 20 years has been toward less competition at the district level (note the correlations between the party competition interaction terms and the counter as well as the correlation between mean competition and the counter), more single-member districts, and fewer voters per election district. Consequently, we have seen the rise of state legislative election systems in which partisan seat changes are increasingly less responsive to partisan vote changes. The result of the latter phenomenon could be that state legislators have (or will) become insulated from electoral defeat and less inclined to respond to constituency needs or desires.

In this chapter, I will discuss the questions I sought to answer in this dissertation and why I feel the research design was a good one. I will briefly reiterate what I tried to do and what was accomplished in this study. I will also explain the contribution this dissertation makes to the literature on the relationship between seats and votes in legislative elections. This chapter will also include a discussion of the questions about the seats-votes relationship that remain unanswered and the new questions that have emerged as a result of this dissertation.

EXPLANATION OF THE RESEARCH DESIGN

In this dissertation I have been concerned with the relationship between partisan votes and partisan seats in
legislative elections. Specifically, I have asked questions related to the causes of partisan representational form and partisan bias in legislative elections. Does partisan competition at the district level affect the representational form of the seats-votes relationship for the electoral system? Do election rule variables related to the size and number of districts affect an electoral system's representational form? Do a party's control of redistricting and willingness to manipulate district boundaries to gain an electoral advantage incorporate partisan bias into an election system?

I have sought to answer these questions by testing hypotheses on lower house legislative elections in 46 states from 1968 to 1986. The questions I have raised and the electoral contexts I have chosen to study have provided a number of advantages to other possible research designs. First, the results from this study have been found to be generalizable to a relatively large number of election systems, each providing its own political, economic, and social context to the elections. Second, the large number of cases employed in this study generate more confidence in the findings because of the positive statistical qualities associated with large samples. Third, the results generated in studies of U. S. state legislative elections contribute to knowledge in the areas of legislative politics and in U. S. state politics. Fourth, such a study may
raise new questions that are of interest to scholars of legislative elections and to scholars of U. S. state politics.

IMPLICATIONS OF THE STUDY

This dissertation makes at least three contributions to the state of knowledge pertaining to legislative elections and U. S. state politics. The first contribution made by this dissertation is the description of the seats-votes relationship in the U. S. states. The simple act of describing the representational form and partisan bias for the individual elections in the time series provides the democratic theorist a "plumb line" with which to judge the ability of each state to act in accordance with traditional normative concerns about democracy. The dissertation makes a second contribution to the literature about legislative elections. The study fleshes out the empirical relationship between the district vote and aggregate representational form and election rule variables and representational form. Third, the dissertation contributes to our understanding of U. S. state politics by addressing the issue of how partisan bias may be introduced into a state election system.

Normative Concerns About Representation

While classical definitions of representation are hard to pin down, there have been a number of scholars who were
concerned with the methods by which the will of the people is translated into concrete political realities. Eulau and Karps (1978) and Fenno (1978) suggest that the activities of representatives on behalf of the people (usually defined in terms of constituents) are the most important components of representation. A host of other scholars point out that the translation of partisan votes into legislative seats constitutes one of the most basic acts of representation. Of course, in my study, I am more concerned with the representative nature of election systems in the U. S. states than with the activities of representatives.

Obviously, the translation of partisan votes into partisan seats can take a variety of patterns. It is common for scholars to debate the virtues and vices of proportional patterns of representation and majoritarian patterns of representation (Garand and Parent 1991). Some theorists hail proportional representation systems as being more democratic because they allow for a more direct translation of public preferences into legislative seats. Other scholars stress the fact that majoritarian systems permit an inflated majority of seats to the party that receives the most votes, thus creating a legislature that is more likely to have clear majorities that (arguably) can pass legislation desired by a majority of the people.

In previous studies, the electoral systems of U. S. states had been determined to be majoritarian in nature,
although the exact degree of the seat inflation given a certain percent of the vote had varied from study to study. However, in earlier works scholars had examined seats and votes in the aggregate or studied district-level voting returns but excluded uncontested seats. In this dissertation, I have controlled for turnout across districts by reporting partisan district vote percentages and I also have included uncontested election districts. The justifications for my methodology are twofold.

First, much knowledge is lost when uncontested elections are excluded from election analyses. For example, use of only contested elections in Arkansas means that inferences about the election system must be made on the basis of only ten percent of the elections in the time series. Similar problems would occur in other states (particularly in the South) if uncontested elections were excluded from the analysis.

Second, while partisan turnout differences are important in explaining seats and votes in the aggregate, it must be remembered that results in each district determine how the seats are to be distributed. One can examine the percentage of the district votes won by each party and still make valid and reliable inferences about partisan representational form and partisan bias. In fact, if uncontested elections are to be included in a study, use of the aggregate vote in the state might create a false
impression of the seats-votes relationship since voter turnout tends to be much smaller in uncontested elections. Thus, the seats-votes relationship is measured as the percentage of mean district votes won by Republicans and the percentage of legislative seats won by Republicans.

When I used mean percentage of district party votes and did not exclude uncontested elections, I found that the form of the relationship between seats and votes is slightly majoritarian but less majoritarian than the "cube law" standard. At most points above the 50% vote mark, Republicans receive a percentage of the seats that is inflated when compared with the percentage of the vote they win. The reverse, an inflated seat loss, occurs at points in which Republican vote falls below the 50% mark. Small, uniform hypothetical changes in the partisan percentage of the district votes tend to result in very few seat changes at the extremes of the seats-votes curves but do produce larger seat changes in the competitive range of the distributions.

The U. S. state legislative election systems are balanced in that they are more responsive to vote changes in the competitive range of the distribution than is the case in a proportional system, yet there is not a gross exaggeration of seat changes given any particular vote swing. Normative theorists who advocate a more proportional form of representation than that provided in
many single-member district election systems should be pleased by these findings. The findings suggest that voter preferences are fairly closely translated into legislative seats in U. S. state legislative elections when one treats the partisan votes in all districts as equally affecting election outcomes. However, some normative theorists may prefer even a more majoritarian system. In light of the results reported in this dissertation, proponents of a more majoritarian seats-votes relationship might consider it a weakness that U. S. state election systems are not even more responsive to vote changes when partisan competition is high.

Empirical-Theoretical Contributions Pertaining to Partisan Representational Form

Obviously, the finding that U. S. state legislative elections produce lower representational form parameters than one might expect has empirical ramifications that extend beyond the concerns about representation held by normative theorists. These results, at most, call into question previous methodologies discussed in the previous section. At the least, the use of uniform partisan swing, district vote percentages, and uncontested races offer an alternative to other techniques designed to measure the relationship between seats and votes.

In addition to simply describing the seats-votes relationship in lower house elections in the U. S. states,
I have attempted in this dissertation to answer questions about the causes of partisan bias and representational form in U. S. state legislative elections. In the process of answering these questions, I have hoped to generate findings that can be generalized to elections in other contexts and to increase knowledge about subnational units of government in the U. S. I believe that the results of my study have lived up to my aspirations.

As Tufte suggested as early as 1973, variation in representational form parameters was found to be a function of the distribution of partisan votes across election districts. I found that party competition and the interaction between party competition and the standard deviation and kurtosis of the distribution of Republican votes across districts to be particularly important determinants of representational form. The higher the level of partisan competition and the more districts there were in the competitive range, the larger were the values for representational form. In other words, in states where there was a great deal of party competition at the district level, more seats would change party hands given a particular vote swing than in states in which there was very little district-level competition. These results correspond to the findings of Garand, Parent, and Teague (1989) concerning the translation of popular votes to electoral college votes in U. S. presidential elections.
It has also been discovered that, after controlling for the distribution of the partisan district-level votes, the log of the number of voters per district in the election system affected representational form. As the parsimonious model in Table 6.3 suggests, the larger the district size, ceteris paribus, the more majoritarian is the pattern of the seats-votes relationship. Taagepera's observation that larger districts (in terms of population) produce higher representational form parameters was confirmed in this dissertation.

The findings suggest that, to a large extent, representational form is dependent on the level of party competition at the district level and (to a smaller degree) on the size of election districts. This suggests that attempts to manipulate the election system by changing the rules to produce more majoritarian or more proportional seats-votes relationships may meet with only moderate success. It seems that, holding everything else constant, the creation of larger districts (on the basis of population) is likely to make U. S. state election systems somewhat more majoritarian.

However, partisan competition, the strongest determinant of representational form, is not so easily manipulated. In order for party competition to increase at the district level, the weaker party in the state must run stronger candidates. Perhaps weak parties can benefit from
the coattails of strong gubernatorial or presidential candidates, but these coattails probably will not exist for long. It is likewise improbable that weak parties will be strengthened by redistricting. More likely is a scenario in which the party that controls redistricting receives electoral benefits or incumbents from both parties run in districts that have been made safer from a successful challenge. Thus, it seems that until losing parties are willing to contest elections that have long gone uncontested and to run better candidates across the board, the states are likely to be saddled with electoral systems that are less responsive to slight or moderate changes in partisan voting than many observers would like to see.

Empirical-Theoretical Contributions Pertaining to Partisan Bias

In my opinion, the findings concerning partisan bias contribute more to the literature in U. S. state politics than to the literature in legislative elections. On the whole, and somewhat surprisingly, Republicans tend to benefit from partisan bias in state legislative elections. Part of this bias is perhaps a result of the methodology used in this study. The decision to include uncontested elections means that Republicans (who are less likely to contest state legislative elections than are Democrats), would benefit from a bias if they contested each election and attained a uniform vote following across districts.
However, in states where there are few uncontested elections (i.e., where Republicans are likely to contest elections), a Republican bias is indicative of either Republican control of the redistricting machinery or the distribution of partisan votes according to demographic characteristics of the population.

The results of the bias model offer both confirmation and contradiction with the findings of Niemi and Jackman (1991). They find that partisan gerrymandering does occur in the states, but is less prevalent in the 1980s than in the 1970s. Unlike Niemi and Jackman, however, I disaggregate for each redistricting year. My results do show redistricting effects on partisan bias in 1970 and 1976 but do not illustrate redistricting effects for the large number of elections held in 1972 and 1974. In 1983 and 1984 I find, as do Niemi and Jackman, no effects of redistricting. However, in the large number of elections that took place in 1982 redistricting does seem to enhance partisan bias.

I think that my results for bias are somewhat surprising. If parties truly desire to engage in gerrymandering, they should be more aware of state demographics immediately after the census before migration effects can be felt. It is the case that in 1982, a year in which elections immediately follow redistrictings that are based on the decennial census, there tends to be a bias toward the party that
controls redistricting. However, the 1972 elections do not show redistricting effects.

It should perhaps not be surprising that parties are unwilling or unable to institute blatant partisan gerrymandering in the 1980s. Increased judicial scrutiny to identify racial discrimination and the Supreme Court ruling that charges of partisan gerrymandering are justiciable would lead one to expect that the parties would be more hesitant to engage in gerrymandering over time. The 1982 elections do illustrate moderately strong redistricting effects, but the almost equally important year of 1984 shows no effect of redistricting on partisan bias.

In light of the relatively unsuccessful attempts by scholars to identify the widespread use of gerrymandering in U. S. state legislative elections, it has also been suspected that incumbents of both parties have used technological improvements, primarily in computers and software, to manipulate district boundaries virtually to ensure their own reelections. The suggested existence of a "sweetheart gerrymander" may well be factual since state elections are becoming less competitive over time. Lack of evidence that redistricting increases the level of partisan bias in favor of the party controlling redistricting over much of this time series may also point to a bipartisan or sweetheart gerrymander explanation.
In addition, as was noted in Chapter Six, national elections (particularly presidential elections), may be exerting a coattail effect on state legislative elections (Campbell 1986). In this case, the effects of redistricting could be blurred by voters' tendency to favor the party of the presidential winner in presidential election years and to oppose the party of the president in off-year or midterm congressional elections. There is some evidence from Tables 6.7 through 6.10 that this phenomenon may be occurring. If presidential coattails are operating in state legislative elections, this may explain why redistricting effects seem to be present but are not very strong (See Table 6.5). It could be that presidential coattails in presidential elections and the lack of coattails in nonpresidential election years are stronger influences on the seats-votes relationship than are the effects of redistricting.

AN AGENDA FOR FUTURE RESEARCH

While the findings for representational form and partisan bias offer a contribution to our knowledge of U. S. state legislative elections, much remains to be explained for both of these characteristics of state election systems. One could point to a number of variables that could be included in future analyses of elections.

Which variables might one suggest as possible explanations for variation in representational form? Tufte,
commenting on national elections, suggests that the "more nationally oriented the politics of a country or the more nationalized the forces prevailing in a given election, the greater the swing ratio -- other things being equal (1973, 547)." This should occur because the more nationalized the forces are in an election, the more uniform will be the electoral swings across the nation. Of course, Tufte’s explanation is applicable to studies in which actual election results, rather than the uniform partisan swing approach, are used. However, since the uniform partisan swing method already assumes that all districts are uniformly affected by a partisan vote swing, then Tufte’s suggestion must be modified to fit into the framework adopted in this dissertation.

It does seem reasonable that national- or state-level forces that counteract the prevailing electoral tendencies in a state should contribute to a higher level of party competition at the district level. In Georgia, for example, if a popular Republican runs for President, for the U. S. Senate, or for Governor at the same time state legislative elections are held, one might expect that the Republican state legislative candidates would benefit from a coattail effect (See Campbell 1986). If so, one would expect that partisan competition would be enhanced and representational form values would increase.
District-level factors may also affect the representational form value of a state electoral system. Both King (1989) and Tufte (1973) point out that incumbency voting could affect the swing ratio. King (1989) has illustrated that this factor decreases responsiveness in congressional elections. Incumbency could play a role due to voter loyalty to incumbents or to incumbents' ability to use legislative spending (i.e., spending on the institution itself, such as for personal staff who can engage in constituency casework) to insulate themselves from electoral defeat (Holbrook and Tidmarch 1991, Weber, Tucker, and Brace 1991). Incumbency effects can also be asserted due to the unwillingness of challengers to face incumbents (Holbrook and Tidmarch 1991, Jewell and Breaux 1991) or to considerations granted to incumbents in redistricting (Basehart and Comer 1991, Niemi and Jackman 1991).

Whatever may be the basis for incumbency advantages, an increase in voting in favor of incumbents should reduce the value of the representational form parameter in state legislative elections. Interestingly enough, all the previously mentioned variables that might increase incumbency voting (and the variable "incumbency voting" itself) are increasing over time in lower house state legislative elections. Finally, if the size of districts is important in explaining representational form, one could analyze state senate elections with the expectation of finding
larger representational form values since state senate districts are larger than state representative districts.

What factors might affect partisan bias in a state? As noted in Chapters Three and Six of this dissertation, the literature centers around redistricting effects. In addition to the attempts by King (1989) and Basehart and Comer (1991) to identify elections where the record indicated a partisan attempt to gerrymander, there are other objective characteristics of parties that might give a clue about willingness to utilize redistricting for partisan gain. There is some evidence that parties in two-party competitive states are less willing to engage in partisan gerrymandering. On the one hand, Niemi and Jackman (1990, 16) suggest that dominant parties in a strong two-party environment use restraint in redistricting because of fear that they may be victims of gerrymandering should they become the minority party. On the other hand, Niemi and Jackman believe that majority parties in a strong two-party state may be more afraid of close scrutiny by the opposition party and, potentially, by the courts.

Another factor that could contribute to partisan bias is difference in partisan turnout across districts. For example, Campbell (1991) has found that Democratic candidates in U. S. congressional elections win disproportionately in electoral districts that have low total voter turnout and low voter turnout for the winning candidate.
This means that Republican candidates have been the victims of partisan bias because they expend more votes to win a seat than do their Democratic counterparts. In order to test this turnout theory, one must use the historical method of calculating seats and votes. Using the uniform partisan swing method as I have done virtually necessitates using an aggregated mean district vote percentage so that the one percent incremental swings can be applied to the election data. However, use of the mean district vote controls for turnout and consequently weighs each district equally when party votes are aggregated to the state level. One must adopt the actual total votes from the districts and the state to test the theory that turnout differences affect partisan bias. In the absence of extremely strong findings pertaining to partisan gerrymandering, however, such a study may well be warranted.

In addition, it does seem to be the case that presidential coattail effects operate in state legislative elections. The impact of presidential coattails on a party's seat total has been noted by Campbell (1986), but the question of the interaction between redistricting effects and coattail effects has not be answered. The question of redistricting effects versus coattail effects is certainly worthy of future research; some attempt to introduce a coattail variable into the partisan bias model would be a step in the right direction.
The relationship between seats and votes in democratic election systems has long been a subject of scholarly inquiry. Congressional elections have been the focus of much of the research on seats and votes undertaken by scholars of American politics. This dissertation is a contribution to the emerging seats-votes literature pertaining to the U. S. states. Hopefully, the findings in this study will generate additional attempts to discover why certain seats-votes patterns exist in the election systems of both legislative houses of the U. S. states.
BIBLIOGRAPHY


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## Appendix A. Representational Form by State and by Year

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*Election was actually held in 1969

*Election was actually held in 1971

*Election was actually held in 1973

*Election was actually held in 1975

*Election was actually held in 1977

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<td>1.265&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.704&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0.424&lt;sup&gt;d&lt;/sup&gt;</td>
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*Election was actually held in 1969

<sup>a</sup>Election was actually held in 1971

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^Election actually held in 1987
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'Election actually held in 1979
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'Election actually held in 1983
'Election actually held in 1985

'Virginia exhibited a coefficient of 0.691 in the 1987 election
**Figure B.9**
Representational Form and Partisan Bias over Time for Idaho, 1968-1986

**Figure B.10**
Representational Form and Partisan Bias over Time for Illinois, 1968-1986

**Figure B.11**
Representational Form and Partisan Bias over Time for Indiana, 1968-1986

**Figure B.12**
Representational Form and Partisan Bias over Time for Iowa, 1968-1986
Figure B.25
Representational Form and Partisan Bias over Time for New Mexico, 1968-1986

Figure B.26
Representational Form and Partisan Bias over Time for North Carolina, 1970-1984

Figure B.27
Representational Form and Partisan Bias over Time for North Dakota, 1968-1986

Figure B.28
Representational Form and Partisan Bias over Time for Ohio, 1968-1986
Figure B.33
Representational Form and Partisan Bias over Time for South Dakota, 1968-1986

Figure B.34
Representational Form and Partisan Bias over Time for Tennessee, 1968-1986

Figure B.35
Representational Form and Partisan Bias over Time for Texas, 1968-1986

Figure B.36
Representational Form and Partisan Bias over Time for Utah, 1968-1986
Figure B.37
Representational Form and Partisan Bias over Time for Virginia, 1969-1987

Figure B.38
Representational Form and Partisan Bias over Time for Washington, 1968-1986

Figure B.39
Representational Form and Partisan Bias over Time for West Virginia, 1968-1986

Figure B.40
Representational Form and Partisan Bias over Time for Wisconsin, 1968-1986
Figure B.41
Representational Form and Partisan Bias over Time for Wyoming, 1968-1986
## Appendix C. Partisan Bias by State and by Year

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'Election was actually held in 1973

dElection was actually held in 1975

eElection was actually held in 1977
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<sup>f</sup>Election actually held in 1979

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<sup>b</sup>Election actually held in 1983
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'Election actually held in 1979
'Election actually held in 1992
'Election actually held in 1993
'Election actually held in 1985
'Virginia exhibited a coefficient of -0.132 in the 1987 election
VITA

Kenneth Alan Wink was born and raised in Louisiana and educated in the Louisiana public school system. He received a B.A. in Government from Northeast Louisiana University in 1984. After earning an M.A. in Church-State Studies from Baylor University in 1987, Mr. Wink pursued the Ph.D. in Political Science at Louisiana State University. Mr. Wink, who is currently an Assistant Professor in the Department of History, Political Science, and Geography at Southern Arkansas University, hopes to graduate from the doctoral program at L.S.U. in 1992. In addition, Mr. Wink has accepted a position as Assistant Professor in the Department of Political Science and Public Affairs at Western Carolina University beginning in Fall, 1992.

Mr. Wink has studied American politics, public administration and public policy, and comparative politics (Western Europe) at L.S.U. In the American politics subfield, Mr. Wink has specialized in state politics and policymaking and legislative politics. Mr. Wink is the coauthor of a number of articles on presidential and congressional elections that have appeared in the Western Political Quarterly and the American Politics Quarterly. Currently, he is interested in the factors that affect the translation of partisan votes into partisan seats in U. S. state legislative elections.
DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Kenneth Alan Wink

Major Field: Political Science

Title of Dissertation: Partisan Representational Form and Partisan Bias in U.S. State Lower-House Legislative Elections: A District-Level Approach

Approved:

[Signature]
Major Professor and Chairman

[Signature]
Dean of the Graduate School

EXAMINING COMMITTEE:

[Signature]
Whitney B. Mundt

[Signature]
Randall E. Will

[Signature]
S. Richard Arbo

[Signature]
Mitchell F. Price

[Signature]
Diana E. Campbell

Date of Examination:

March 16, 1992