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On the (mis)measurement of legislator ideology and shirking*

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Abstract. In this paper, we show that current statistical measures of legislator's shirking are implicitly based on the electoral concept of a unique majority rule equilibrium point in the policy space where elections are contested. We note that such equilibria do not exist generically and present statistical results showing that cross-sectional regressions where legislators' voting indices are predicted by district average demographic and economic data are mis-specified. We also discuss a weaker equilibrium construct, the uncovered set, and present statistical evidence showing that differences in voting behavior between Senators from the same state are positively related to the heterogeneity of the electorate. We argue that current evidence alleged to show shirking by Senators is equally consistent with Senators who perfectly represent an idiosyncratic constituency that cannot be represented by district average data.

1. Introduction

Understanding legislators' voting behavior is important both for predictive and normative purposes. The main theme in the current empirical literature is the distinction between economic and ideological voting by elected representatives. Ideology is typically measured by an interest group rating of legislator's voting. Several studies have gone further, attempting to isolate idiosyncratic legislator ideology, often labelled as shirking. The existence of such measures is used to imply that constituent interest cannot explain legislative outcomes and that our current form of government may suffer from excessive discretion on the part of elected representatives.

These conclusions may well be correct. However, the evidence typically used to support them is not consistent with voting theory and is derived from ques-

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tionable empirical techniques. In this paper we review the theory of two candidate elections, pointing out the restrictive assumptions implicit in the empirical shirking literature, and then present some simple statistical evidence showing that the techniques used to create shirking measures are inappropriate and that a typical shirking variable has no significant effect on reelection outcomes in the Senate. We also present evidence in support of a weaker notion of rational candidate behavior, the uncovered set.

2. The empirical literature

The empirical literature on ideological voting and legislator shirking begins with Kau and Rubin's (1978, 1979, 1982), studies on the House. Kau and Rubin use the Americans for Democratic Action (ADA) voting score to measure ideology. They generate an ideology residual by regressing ADA scores on district demographic variables, and use the estimated residuals in subsequent equations to predict votes on specific bills. This residual is consistently significant and Kau and Rubin conclude that ideology matters, in a fundamental sense.

Kalt and Zupan (1984, 1990) perform a similar analysis, using Senate rather than House data. They are the first to explicitly label the residuals from an equation predicting ADA scores with state demographic variables "Senator-specific ideology" and to call the significance of those residuals in subsequent voting equations shirking. They argue that their results show senators indulge their own preferences at the expense of constituent interest. Nelson and Silberberg (1987) perform a similar analysis.¹

Others (e.g., Glazer and Robbins, 1985; Dougan and Munger, 1989; and Higgs, 1989), simply compare differences in the voting records of senators from the same state. This method is closely related to the regression approach discussed above. Regressions of voting indices on demographics will predict identical behavior for all legislators with identical geographic districts. The only difference is that simply comparing state senate pairs eliminates the restriction that the effect of demographics on representation is identical across states, which is imposed with a regression method.

These papers all implicitly assume there exist Condorcet winning electoral platforms in all electoral districts. A platform x is a Condorcet winner in policy space A if x beats all the other possible platforms (elements) in A in pairwise elections. This must be an unstated assumption of the literature because the only way to conclude that deviations in the voting behavior of senators from the same state constitutes shirking is to have in mind a model where there is a single most preferred candidate policy position that would always command a majority in a pairwise election against an opponent with any other position.

This insures a single mandate from the electorate and then the conclusion that non-identical behavior by a state's senators implies anti-constituent shirking follows.

While some authors appreciate that their measures are problematic, the general feeling appears to be that the shirking measures employed are obviously appropriate.² For example, Higgs (1989) claims, "Whenever a state's two senators cast votes that disagree, we know that one of them is acting against the constituency preference." Given the dogmatism in the empirical literature it is ironic that the theoretical literature on elections provides little hope that Condorcet platforms exist generically.

3. Theory of elections

Duncan Black (1958) proved that the policy position most preferred by the median voter is a Condorcet winner (defeats all other positions) when the policy space is unidimensional and all voters have single peaked preferences. These are extremely restrictive conditions. There is little doubt that statewide elections are multi-issue contests. Voting theorists have been working for 30 years to generalize Black's theorem, finding that Condorcet platforms do not generally exist in multi-dimensional policy spaces.

Kramer (1973) shows that if more than half of the voters have identical preferences, then their most preferred policy platform is a Condorcet winner, regardless of the number of dimensions in the relevant policy space. Davis, DeGroot and Hinich (1972) prove that when voter utility is measured by the Euclidian distance from their most preferred policy point, there will be a unique winning platform when one voter's ideal point is a median in all policy dimensions. Plott (1967) relaxes the assumption of Euclidian utility, and proves that, for convex voter preferences, a Condorcet platform exists when it is the ideal position for one voter, and all others can be paired off so that their contract curves pass through the equilibrium point.

The main theoretical result is a negative one; unique majority rule equilibrium platforms do not generally exist.³ The existence results sketched above rely on either extreme homogeneity or preference symmetry in the electorate. Recently, several papers have derived boundaries on the range of viable candidate positions in multi-dimensional policy spaces. For example, Miller (1980) and McKelvey (1986) develop the concept of the uncovered set to characterize undominated candidate positions. For any two points in a policy space, y covers x if y commands a majority vote in a pairwise comparison with x , and all the points that defeat y will also defeat x . The uncovered set is then defined as all points in a policy space that are not covered by any point.

Assuming that rational candidates will not adopt dominated platforms is an

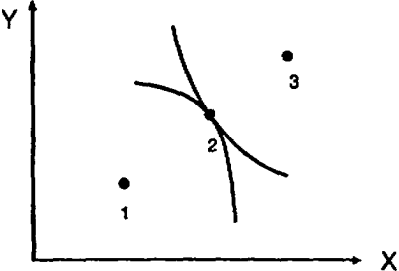
attractive way to restrict candidate choices and the set of possible election outcomes. McKelvey and Ordeshook (1982) present some experimental results showing that in artificial electorates without a unique Condorcet winning platform, actual candidate platforms are largely restricted to the domain of the uncovered set. McKelvey also derives boundaries on the size of the uncovered set along with the interesting condition that increased voter homogeneity reduces the size of the uncovered set. We present some evidence consistent with this result in our empirical section below.

4. Geographic vs. electoral constituencies

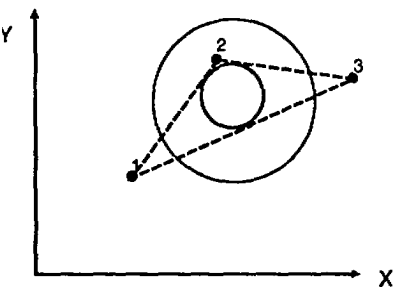
The discussion above provides a basis for reflection on the nature of electoral competition in the Senate. Given the relevant policy space and the distribution of voter preferences across that space, electoral platforms can be split into two categories, dominated and undominated. If the dimensionality of the policy space is greater than one, and less than half of the voters have identical preferences there is not a unique undominated platform. Senators with different voting records may simply have chosen different undominated platforms. That is, they may each be serving a different constituency. Since incumbent senators do not run against each other, or even have separate elections at the same time, differences in their positions can persist. The implication of this reasoning is that shirking cannot be measured by comparing intra-state differences in senator behavior.

Figure 1 illustrates the problem described above. Each panel shows a possible configuration of most desired policy platforms in a two dimensional policy space (X, Y) for three voters, 1, 2, and 3. In panel A, the ideal points are symmetric and 2's most preferred point is a median in both dimensions. Assuming Euclidian preferences (circular indifference curves), point 2 is a unique Condorcet platform in this space. There is no other point that could beat it in a pairwise election. Panels B and C have no such unique electoral equilibria. In B, 3's ideal point has been moved down just enough so that 2 is no longer the general median. The triangle connecting the three ideal points (again assuming Euclidian preferences) is the Pareto set. The large circle is the upper bound of the uncovered set; all the points that are not dominated by some other point.⁴ The distribution of preferences is not symmetric and there is no Condorcet winner. Panel C simply illustrates McKelvey's result that increasing preference heterogeneity increases the size of the uncovered set.

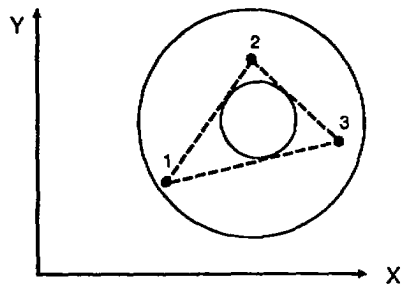
There is another relevant literature that has remained curiously separate from the theory of elections. Several political scientists have studied the behavior of individual politicians in their reelection campaigns. Specifically, Richard Fenno (1978) shows that incumbent House members frequently make



A: symmetry and a Condorcet winner



B: asymmetry and the uncovered set



C: more asymmetry increases the size of the uncovered set

Figure 1. Voter preferences and electoral equilibrium

a distinction between their geographic and electoral constituencies. Fenno argues that the behavior of a legislator cannot be predicted by the characteristics of the entire district (geographic constituency). Legislators have a coalition of interests that they serve in order to win election.⁵ The interests of this electoral constituency are what primarily matters. Fenno (1978: 27–28) discusses his findings as follows:

Political scientists have a heavy investment in role conceptions that distinguish between the ‘trustee’ who follows his independent judgment and the ‘delegate’ who follows the wishes of his constituency. But now we must ask, which constituency . . . this kind of choice is one in which the congressman must choose between constituencies *within* the district.

Fenno’s direct observations coincide with the implications of the theoretical literature. Congressional districts are not typically such that one particular platform commands majority support against all others. Fenno’s book contains numerous descriptions of congressmen searching for the optimal coalition of voters. There is a sense in which legislative shirking and idiosyncratic electoral constituencies are observationally equivalent theories. Both predict senators from the same state may often vote differently, and both predict residuals from a cross-sectional ADA regression may be significant predictors of legislator behavior.

5. Examining results in the shirking literature

In this section, we reinforce the theoretical criticism of the shirking legislator literature by showing that coefficients relating average state characteristics to senator ADA scores do not pool across simple divisions of the sample, and that residuals from these equations, as well as differences in ADA rankings of senators from the same state, are not significant determinants of Senate reelection outcomes. We then present some simple results showing that differences in senator voting behavior are significantly positively related to the heterogeneity of the voters in the state. These results are consistent with McKelvey’s result on the size of the uncovered set.

5.1 Equations predicting ADA scores

First, we present estimates of equations predicting senators’ ADA scores with average state variables. Since most of this type of work has been done on a single cross-section, we expand the analysis and estimate four separate equa-

Table 1. Using state-average data to predict ADA scores for incumbent senators

Variable	Eq. 1, 1977-78	Eq. 2, 1979-80	Eq. 3, 1981-82	Eq. 4, 1983-84
Intercept	-210.06 (3.02)	-182.54 (2.84)	-294.34 (3.51)	-326.05 (3.89)
McGovern vote in 1972	2.14 (4.83)	1.55 (3.79)	1.76 (3.27)	1.86 (3.49)
%Non-white	0.33 (1.46)	0.39 (1.87)	0.64 (2.33)	0.86 (3.17)
Median age	4.15 (2.54)	2.87 (1.90)	6.07 (3.04)	6.14 (3.03)
%College grads	1.81 (1.03)	-0.83 (0.51)	1.06 (0.49)	0.20 (0.09)
%White collar	0.19 (0.14)	1.16 (0.91)	1.17 (0.69)	2.65 (1.55)
%Blue collar	0.34 (0.55)	0.56 (0.97)	1.29 (1.69)	1.23 (1.63)
Per capita income	-0.001 (0.38)	0.001 (0.30)	-0.004 (1.11)	-0.008 (2.16)
%Non-urban	0.39 (1.61)	0.32 (1.42)	0.24 (0.80)	0.38 (1.32)
South	-9.32 (1.17)	-11.35 (1.54)	-15.26 (1.59)	-17.72 (1.87)
R ²	0.45	0.36	0.36	0.38
F	8.30	5.75	5.76	6.29

Numbers in parentheses are t-statistics.

tions, one each for 1977-78, 1979-80, 1981-82 and 1983-84. The dependent variable in each case is the average ADA score of each incumbent senator over the period. Our explanatory variables are chosen to be similar to those used by Kalt and Zupan (1988). We use %vote for McGovern in 1972, %nonwhite, median age, %college graduates, %blue-collar workers in the labor force, %white collar workers, per-capita income, %non-urban and a dummy variable for the south. These OLS regressions are presented in Table 1, and explain between 35 and 45 percent of the variation in the ADA index across senators.

Our concern here is the stability of these equations. The arguments presented above imply that average state characteristics may not be good predictors of the preferences of the electoral constituencies of individual senators. By specifying some crude alternative hypotheses, we can at least test whether different groupings of senators have systematically different cross-state coefficients. For example, assume that Republican senators all serve the same electoral constituencies in any state, and that Democrats all serve a common, but different than the republican, constituency. Then, splitting the sample by party

Table 2. Testing coefficient stability in the ADA equations

	Hypothesis/year	1977-78	1979-80	1981-82	1983-84
H ₀ :	Republicans and Democrats have same coefficients	8.01	7.73	15.19	16.10
H ₀ :	Relative conservatives and liberals have same coefficients	3.72	4.40	4.58	3.56
H ₀ :	50 most liberal and 50 most conservative have same coefficients	18.70	18.61	19.60	20.40

Entries in the matrix are F-statistics testing the null hypothesis of stable coefficients against the simple alternatives. The critical value at the 0.05 (0.01) level is 2.62 (4.08).

and estimating a separate equation for each group should improve the fit of the simple models in Table 1. Alternatively, assume that the relatively more conservative senators in each state's pair all serve the same electoral constituency, and the liberal half of each delegation serves a different coalition. This provides a different metric for splitting the sample. Finally, assume that the 50 most liberal senators on an absolute scale all serve one constituency and the 50 most conservative another. This too can be used to split the sample and test for improvement in the fit of the Table 1 equations.

Table 2 reports the results of these three pooling tests for each of the four regressions in Table 1. In all 12 cases the null hypothesis that the coefficients are constant across the alternative groupings is rejected. Our purpose is not to endorse any of the competing alternative hypotheses; we believe them all to be false. The point is to demonstrate that the nature of electoral constituencies is idiosyncratic by showing that the single equation model used in the literature is contradicted by a host of alternatives.

5.2 *The effect of shirking measures in reelection equations*

If the residuals from a Kalt-Zupan type of equation do measure, in some way, behavior by senators that is against the interest of their constituents, then these measures should weaken their reelection prospects. Glazer and Robbins (1985) tackle this problem using the difference between Conservative Coalition scores of the two senators in a state as a measure of anticonstituent behavior, finding that bigger differences reduced the probability of reelection. However, they do not employ a well-specified model (the CC vote gap is the only significant variable), or report the change in the marginal probability of defeat associated

with different sized deviations.⁶ Here, we use either the residuals from the ADA regressions in Table 1 or the difference in senator's ADA scores within a state as explanatory variables in a model of election outcomes adapted from Grier (1989, 1990). The sample covers the 96 contests over the 1978–1984 period where an incumbent senator ran for reelection and faced opposition, and the dependent variable is the percent of the vote received by the incumbent. The independent variables are, lagged vote %, real incumbent spending per capita (and incumbent spending squared), real challenger spending per capita (and its square), real federal spending per-capita, the % Δ in state unemployment adjusted for whether the senator is the same political party as the president, and the absolute value of either the ADA residual from Table 1 or the difference in ADA score between the state's two senators.⁷

Results are reported in Table 3. The absolute value of the ADA residual is negative, but completely insignificant, while the absolute value of the difference between the ADA scores of the incumbent in the election and his partner in the state is positive, but equally insignificant. The signs and significance levels of the other variables are invariant with respect to the inclusion of these measures of shirking. These results can distinguish between the legislator shirking and idiosyncratic electoral constituency explanations of ADA residuals and senate delegation voting differences, and they are strong evidence against the shirking interpretation.⁸

Both theory and simple empirics cast considerable doubt on the wisdom of using differences in behavior by legislators with the same geographic district boundaries (or residuals from a cross-sectional ADA regression) as a measure of personal ideology or shirking. The theory of two-candidate elections shows that in multi-dimensional policy spaces, there is more than one undominated platform and our empirical results above show that assuming the contrary can cause severe problems. We conclude this section by offering a simple statistical model predicting differences in voting behavior by senators from the same state *with measures of the heterogeneity of the electorate.*

5.3 *The uncovered set and senator voting differences*

In a single issue district, or one with more than 50 percent identical voters, theory tells us that the most preferred policy point of the median voter in the district is the unique winning platform. In a multi-issue district without extreme voter homogeneity, the most we can say is that in the long run, winning platforms will be elements of the uncovered set. Given McKelvey's result that the size of the uncovered set increases with voter heterogeneity, the difference in senators' voting patterns in a state is a positive function of the heterogeneity of the electorate.⁹

Table 3. Shirking measures and the reelection of incumbent senators, 1978–1984

Variable	Eq. 1	Eq. 2
Intercept	51.04 (10.07)	48.41 (8.78)
%Vote ₋₁	0.13 (1.85)	0.20 (2.07)
Incumbent\$	0.028 (4.15)	0.026 (4.40)
(Incumbent\$) ²	-0.15e ⁻⁰⁴ (3.28)	-0.12e ⁻⁰⁴ (3.29)
Challenger\$	-0.074 (6.41)	-0.063 (5.87)
(Challenger\$) ²	0.57e ⁻⁰⁴ (3.94)	0.42e ⁻⁰⁴ (3.54)
Federal Spending	3.01 (2.03)	1.88 (1.78)
%ΔUnemployment	-0.08 (3.11)	-0.07 (2.84)
Abs(ADA residual)	-0.06 (1.10)	
Abs(ADA difference)	-	0.037 (1.01)
R ²	.54	.53
N	96	96

Numbers in parentheses are t-statistics. All dollar figures are adjusted for inflation and divided by population (in 1000's). %Δunemployment is multiplied by -1 if the incumbent senator is the opposite party as the president.

Here we test whether voter heterogeneity affects the differences in same state senator's voting patterns using data from 1977–1984, covering the 95th–98th Congresses. We have 200 observations (50 states, four Congresses) on the dependent variable, the absolute value of the difference between the ADA score of the senators *i* and *j* from each state *k* in each congress *t*; $DADA_{ikt} = |ADA_{ikt} - ADA_{jkt}|$. The challenge here is to generate a reasonable proxy for voter heterogeneity. Data exist on age, race, income, and occupational differences by state, but these numbers are generally aggregated into a few categories and are reported only on a per-census basis. We use a relatively simple summary variable measuring heterogeneity that can vary annually. This variable is the standard deviation of the Conservative Coalition voting scores of the House delegation in each state and each Congress ($SDCC_{kt}$).

We also include several other variables on the right-hand side of the model. $PARTY_{kt}$ is a dummy variable equalling 1.0 if the state's Senate delegation in Congress *t* is from a single political party. $ELECT4_{kt}$ is a dummy variable to control for differences in time between elections. It equals 1.0 for states *k*

Table 4. Senate ADA voting differences and the standard deviation of house delegation conservative coalition scores, 1977-1984

Variable	Eq. 1	Eq. 2	Eq. 3	Eq. 4	Eq. 5	Eq. 6
Intercept	27.77 (7.64)	29.65 (6.80)	27.73 (7.86)	26.21 (6.45)	28.14 (5.90)	25.56 (6.59)
SDCC	0.36 (2.82)	0.34 (2.65)	0.36 (2.87)	0.37 (2.91)	0.35 (2.73)	0.37 (2.99)
PARTY	-22.43 (8.51)	-23.00 (8.36)	-22.56 (9.24)	-22.39 (9.02)	-22.96 (8.85)	-22.58 (9.77)
ELECT4	-0.06 (0.02)	0.03 (0.01)	0.23 (0.09)	-	-	-
ELECT	-	-	-	1.85 (0.69)	1.79 (0.67)	2.68 (1.09)
TENURE	-	-0.15 (0.78)	-	-	-0.14 (0.77)	-
ONEREP	-	-	9.39 (2.06)	-	-	9.77 (2.15)
R ²	0.35	0.35	0.36	0.35	0.35	0.36
F	31.03	23.37	27.47	31.28	23.55	27.94
N	176	176	200	176	176	200

Numbers in parentheses are t-statistics. In equations 1, 2, 4, and 5 the 6 states with single member house delegations are omitted because a variance cannot be calculated. In equations 3 and 6 the value of SDCC for these states is set to zero and DONEREP is set to 1.0.

whose senators in congress t were elected four years apart. ELECT is a variant of ELECT4; it equals 1.0 for states where one senator is up for reelection in the current year. TENURE_{kt} is the absolute value of the difference in tenure between the senators from state k in Congress t . These variables are included to examine whether senators shirk differentially with respect to the timing of elections or length of career.

Table 4 reports the OLS estimation of the following model:

$$DADA_{kt} = a_0 + a_1SDCC_{kt} + a_2PARTY_{kt} + a_3ELECT4_{kt} + a_4TENURE_{kt} + e_{kt} \quad (\text{ELECT})$$

Shirking models would typically predict that the size of the uncovered set is irrelevant ($a_1 = 0$), that elections temporarily constrain or limit ideological indulgences ($a_3 < 0$), and that more senior legislators have more freedom to shirk ($a_4 > 0$). In contrast, assuming nonshirking incumbents located randomly in the uncovered set, we predict $a_1 > 0$, $a_2 < 0$, and $a_3 = a_4 = 0$. The regressions in Table 4 support the argument that differences in ADA scores are related to voter heterogeneity and not necessarily to shirking. Equations 1, 2, 4 and 5 are estimated on data for the 44 states with more than one congressional

Table 5. Senate ADA voting differences and direct measures of state diversity, 1977-1984

Variable	Eq. 1	Eq. 2	Eq. 3	Eq. 4
Intercept	-20.38 (0.30)	4.71 (0.16)	-7.10 (0.10)	17.85 (0.63)
PARTY	-24.00 (10.11)	-24.09 (10.20)	-23.18 (9.92)	-23.26 (10.01)
SDI	0.91 (0.41)	-	0.90 (0.42)	-
SKI	0.74 (1.83)	0.63 (2.06)	0.70 (1.79)	0.60 (1.99)
HWORK	-0.01 (1.80)	-0.01 (1.98)	-0.01 (2.56)	-0.01 (2.76)
HETH	0.22 (0.02)	2.10 (0.28)	3.01 (0.34)	4.88 (0.64)
POP	-	-	$0.8e^{-3}$ (3.17)	$0.8e^{-3}$ (3.18)
R ²	0.35	0.35	0.39	0.38
F	21.18	26.54	20.15	24.25
N	200	200	200	200

Numbers in parentheses are t-statistics. Variables are defined in the text.

district (176 total observations) while equations 3 and 4 set SDCC equal to zero for the 6 single district states and adds a dummy variable, ONEREP, to account for them. In all 6 cases, SDCC is positive and significant at the 0.01 level, and the variable representing differences in the timing of elections and tenure in office are insignificant.¹⁰ A one standard deviation increase in our heterogeneity measure increases the difference in a state's senate delegation's ADA scores by 4.26 points.

We also use state level data on income, ethnicity, occupational groups and population to create some other measures of diversity. SDI_k and SKI_k are the standard deviation and skew of each state k 's income distribution. We expect these variables to be positively correlated with differences in senator's ADA scores. $HETH_k$ and $HWORK_k$ are Herfindahl indices for ethnicity and workforce categories in each state k . These variables should have a negative sign; larger Herfindahls mean more concentration. We also use POP, state population, as the simplest and crudest measure of voter diversity. Population should have a positive effect on ADA differences.¹¹

Table 5 contains the results using the variables described above as measures of voter diversity. Greater skewness of the income distribution, more variation in the composition of the labor force, and larger population all significantly increase the difference in intra-state senator voting differences, while the variance of the income distribution and ethnic diversity have no significant effect.

The results reinforce the findings in Table 4. States with greater electoral diversity (larger uncovered sets) have senators whose voting scores differ more than those from more homogeneous states.

6. Conclusion

The purpose of this paper is to argue that progress in understanding the determinants of legislators' voting behavior is not well served by the current econometric practice of using differences in the voting behavior of senators from the same state as a measure of shirking. The theoretical validity of such measures is dubious, and their empirical robustness is lacking. We show that the regressions used to construct the ADA residuals are estimated with improperly pooled data, and that these residuals have no effect on reelection results. In addition, proxy variables designed to measure the size of the uncovered set do not significantly affect intra-state differences in senator's ADA scores. We believe the question of whether legislators systematically shirk, or fail to represent their constituencies is currently unanswered by the literature, and cannot be answered by models making cross-sectional comparisons of the voting behavior of senators.¹²

Notes

1. Some of these studies pre-regress ADA scores on demographic variables, then use the residual along with the demographic variables in the regression explaining votes (Kau and Rubin). Others pre-regress ADA scores on demographic variables that are not included in the second voting equation (Kalt and Zupan), while others (Nelson and Silberberg) use ADA scores along with demographic variables directly in a voting equation.
2. For example, Kalt and Zupan (1984, footnote 20) note that, "Arrow's 1963 General Possibility Theorem and the associated literature on coalitions, cycling and electoral equilibria suggest less confidence in the implicit econometric assumption (embodied in this work . . .) that states' constituent characteristics can be mapped uniquely in their choices of elected representatives."
3. These negative results are produced in models of full information and participation. Equilibrium results can be obtained in some models of incomplete information or probabilistic voting, depending on the nature of uncertainty, goals of candidates and the specification of beliefs. See for example, Hinich, Ledyard and Ordeshook (1972), Coughlin and Nitzan (1981) or Coughlin (1983).
4. The circle representing the upper bound of the uncovered set is derived by finding the smallest circle that intersects all the median lines (which here amounts to a intersecting each of the contract curves) and then drawing a concentric circle with a radius four times as large around it.
5. This is the notion that Peltzman (1984) pursues empirically by attempting to measure average supporter characteristics as variables predicting senators' behavior.
6. Their gap variable is lagged two or four years, there is no control for campaign spending or economic conditions, and their other regressors (%Vote in previous election, a dummy for a party change in the previous senate election, and dummies for party of the president and

- presidential election year) are all insignificant.
7. These regressions are described in more detail in Grier (1989,1990). Specifically Grier (1989) tests the inter-temporal stability of the coefficients and cannot reject stability and performs a specification test for simultaneity between incumbent spending and percent of the vote and finds no evidence against OLS. Grier (1990) test whether increases in unemployment adversely affect all incumbents or only those in the same party as the president as is assumed here, and cannot reject the restriction that party of the president matters. Results are unchanged if %change in per-capita income is substituted for unemployment changes.
 8. Wright (1993), undertakes a quite similar analysis and finds that ADA residuals do decrease the %vote going to the incumbent in a sample covering 1964–1984. Besides the different sample, Wright uses residuals from the full 6 year term or the first four years of the term, while we use residuals from the last two years only. In addition, we control for both incumbent and challenger campaign spending. These variables are not included in Wright's regressions (spending data is not available before 1974) causing a potentially serious specification problem.
 9. It is not our intention here to model electoral competition. A simple assumption sufficient to drive our results is that candidates maximize their utility subject to choosing a platform in the uncovered set. A full model must specify the flexibility of incumbents to change positions, the information incumbents have about challengers, the decision criteria of voters, and the sequence of moves allowed in the electoral game.
 10. Testing to see whether the ADA gap changes near elections is not an optimal test for shirking in off-election years, but it has been used extensively in the literature. See the discussion in the conclusion and note 11 below. It is also possible to interpret the insignificant effects of elections and seniority as evidence of total senator shirking all the time over election cycles and careers. That is, senators do not shirk more with seniority because they can fully indulge their preferences from the beginning of their careers, and elections do not affect shirking because they are not binding constraints on senators' behavior. We thank Mark Zupan for pointing this out to us. However, none of the work we are aware of implies zero representation in Congress and most of it uses these variables in the way we discuss in the text, including Kalt and Zupan (1990).
 11. We used available data on 5 income categories by state from the Statistical Abstract to construct the moments of the income distribution and used data on 4 occupational categories and 5 ethnic categories in calculating the Herfindahls. Note again that these numbers do not change over time. Crain and Goff (1986) use population as a proxy for state heterogeneity.
 12. Krehbiel (1993) also argues that average constituency-based measures are very poor measure of legislator preferences. Lott and Bronars (1993) take a time series approach to the issue, while Lascher, Kelman and Kane (1993) and McDonald and Rabinowitz (1993) use survey data to measure ideology.

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Appendix

Here we list the sources for the data used in the paper.

Senate ADA scores, House Conservative Coalition scores, Party, Years between elections, Campaign Spending, and Election outcomes are from *Congressional Quarterly Almanac* (various volumes) *Politics in America* (various volumes), and *The Almanac of American Politics* (various volumes).

Percent white collar, Percent blue collar, Percent service workers, Percent farm workers, percent college, percent non-urban are for 1980 and are drawn from *Congressional Districts in the 1980's*.

Vote for McGovern in 1972 is drawn from *America Votes*.

Percent non-white, population, income classes, and ethnic classes (white, black, oriental, american indian, spanish) are for 1980 and are drawn from *Statistical Abstract of the U.S.* (various volumes). Per Capita Income and unemployment by state are taken annually from the same source.

The implicit price deflator for GNP is used to convert nominal campaign spending to real terms and is taken from the *Economic Report of the President*.