ISSN 0819-2642
ISBN 978 0 7340 3731 2

THE UNIVERSITY OF MELBOURNE

DEPARTMENT OF ECONOMICS

RESEARCH PAPER NUMBER 1021

December 2007

Demographics, ideology and voting behaviour: A factor analysis of state-wide ballot measures

by

Russell Hillberry

Department of Economics
The University of Melbourne
Melbourne Victoria 3010
Australia.

"Demographics, ideology and voting behavior: a factor analysis of state-wide ballot measures"

Russell Hillberry
Melbourne University

December 2007

Abstract: Formal dimension-reduction techniques are frequently used to interpret data on legislative voting behavior. This study applies one such technique to county-level election returns on 11 ballot measures in South Dakota's 2006 general election. The measures on the 2006 ballot proposed substantial legal and policy changes, and spanned a broad area of the policy space. This and South Dakota's high voter turnout levels makes it especially well-suited for the purpose of analyzing links between election returns and demographic and economic data. The factor analysis suggests a puritan-libertarian spectrum as the best 1-dimensional characterization of political divisions within the state. A county's location on this spectrum is most strongly associated with measures of its population age and per capita income. Factor scores are very good predictors of support for the reelection of the incumbent Governor. (

JEL codes: D72, Y80

Author's contact information: Department of Economics, University of Melbourne, Economics and Commerce Building, The University of Melbourne, Vic 3010, Australia; email: rhhi@unimelb.edu.au.

How do voters think about public policy issues? Are differences in voting behavior best explained by ideology, demography, or economic self-interest? How closely are voters' policy preferences related to their support for elected officials? Answers to these and other questions typically rely on exit polls and other surveys. Snyder (2005) has shown that factor analysis of election returns from multiple ballot initiatives can be used to map the behavior of voters onto an ideological space. This paper applies Snyder's method to county-level returns from ballot measures in South Dakota's 2006 general election. County factor scores are linked to demographic and economic data, and to support for state-wide candidates for elective office.

Nicholson-Crotty and Meier (2002) argue that individual states often have political institutions or circumstances that make them worthy of targeted individual study. South Dakota has an unusually long historical experience with direct democracy. Relatively easy access to ballot routinely generates a large number of ballot measures. South Dakota's 2006 election was notable because the ballot measures proposed significant policy changes across a broad area of the policy space. This election, therefore, presents a useful natural experiment that allows a quantifiable representation of voters' underlying political attitudes.[1] South Dakota's unusually high voter turnout also facilitates analytical links between election returns and demographic and economic data describing South Dakota counties.

An influential literature employs formal dimension-reduction methods to map voting behavior in Congress and statehouses onto implicit ideological spaces.[2] In this analysis a related technique is applied to election returns from 11 ballot measures.

[1] Snyder (1996) maps the behavior of California voters over multiple elections. This analysis is confined to a single election in order to evaluate a specific set of voters.

[2] Poole and Rosenthal (1985, 1991, 1997), among others, investigate voting behavior in the U.S. Congress. Authors applying these techniques to state legislative votes include Aldrich and Batista (2002), Gerber and Lewis (2004), McCarty, Poole and Rosenthal (2006), and Kousser, Lewis and Masket (2007) and Shor, Berry and McCarty (2007).

The estimates suggest that 3 dimensions jointly capture 71 percent of the cross-county variation in voting behavior. Most studies of legislative voting behavior find that legislators divide along a one-dimensional axis that cleaves closely to the standard conservative-liberal narrative in U.S. politics. By contrast, the first factor in this election might better be interpreted as a puritan-libertarian axis. Counties appear to divide over the size and authority of the state and the autonomy of its officers. The most divisive issues pit state enforcement of traditional morality against individual liberty. A secondary axis identifies tensions over methods for collecting revenue for state and local government.

A key focus of the analysis is the relationship between demographic and economic data for a county, and the position of that county's voters in the implicit ideological space. There is, for example, a high degree of correlation between measures of a county's population age and its position on the implicit ideological spectrum. Counties with young populations (i.e. population centers, Native American reservations and counties with large universities) lie at the libertarian end of the spectrum. The second factor, which reveals differences over methods for raising state and local revenues, correlates most strongly with measures of counties' population and per capita income.

A question of further interest is the relationship between a county's location in revealed ideological space and its support for candidates for public office. One can imagine that candidates' campaign strategies or personal characteristics might obscure the relationship between voters' policy preferences and their support for candidates. In this election, however, a county's 1-dimensional factor score is a good predictor of election returns in the state-wide gubernatorial election. Factor scores along the first dimension explain 75 percent of the cross-county variation in the county's

gubernatorial vote. This suggests that voting in the race for the most prominent state office was well explained by the voters' positions on state issues. Votes in the race for the at-large U.S. House seat are less well-explained by implicit ideological positions. This much weaker relationship may indicate that voters successfully distinguish state and federal issues.

The structure of the paper is as follows. Section I argues that features of the South Dakota political culture and the election of 2006 make it worthy of further study. Section II describes the results of the factor analysis. Section III evaluates the link between voters' ideological positions and their votes for elective office. Section IV concludes.

I. Context

I.A. Why South Dakota?

Nicholson-Crotty and Meier (2002) argue that variation in states' political cultures and institutions often give rise to situations in which a single-state study can inform the broader literature. While many states now use ballot measures, relatively few have a political culture or history as infused with direct democracy as South Dakota. From its founding in 1889, South Dakota allowed constitutional amendments via ballot measures. In 1898, the state became the first to devolve legislative power directly to its voters, amending its constitution to allow initiatives and referenda. Ballot access in South Dakota is also quite easy, so that the state's voters often consider a wide variety of policy proposals in a single election.[3]

[3] To qualify for the ballot, a proposal must have signatures numbering no less than 5 percent of the total vote in the most recent gubernatorial election. In the 2006 election, that requirement meant that 16,776 registered voters were needed to sign a petition for it to be put on the ballot. Recent years have seen relatively few ballot measures (3 in 2004, 4 in 2002). In 1998, there were 9 questions on the general election ballot.

South Dakota is also unusual among American states for its high voter turnout. In 2006, 58.7 percent of the eligible voting age population participated in the election, compared to 41.1 percent in the U.S. as a whole.[4] One of the objectives of this study is to link political behavior of the counties to demographic and economic data at the county level. While voters are clearly not a representative sample of the population, high voter turnout in South Dakota means that the link between the underlying characteristics of the population and the political choices of the voting subsample is likely to be stronger than in other states. The combination of high voter turnout and numerous ballot initiatives make South Dakota an ideal laboratory for the questions evaluated below.[5]

South Dakota's 2006 general election voters were faced with 11 ballot measures. These measures spanned a broad area of the policy space, and in many cases made substantial proposed changes to South Dakota law.[6] The combination of a large number of ballot measures, a wide scope of the policy space, and the significance of proposed changes to South Dakota law suggest that this election offered an excellent opportunity to identify the characteristics of political divisions within the state. The following section offers a brief description of the measures facing South Dakota's 2006 voters.[7]

---

[4] Data from http://elections.gmu.edu/Voter_Turnout_2006.htm (accessed December 6, 2007). These data remove ineligible voters (such as convicted felons and non-citizens) from the voting age population prior to calculating turnout figures. Since ineligible voter populations are relatively smaller in South Dakota, its turnout as a share of voting age population is even higher, relative to the rest of the United States. South Dakota's 2006 turnout as a share of registered voters was 67.3 percent.

[5] South Dakota's high voter turnout and its robust culture of direct democracy may well be linked. Bowler and Donovan (2002) find evidence that voters with access to direct democracy have more positive attitudes about their ability to influence government.

[6] An important advantage of ballot measures over survey research is that, in the case of ballot measures, voters know that their decision will take the force of law. We might therefore expect a more considered response than is likely in many surveys. Another advantage is that the universe of votes can be considered, without the sample selection issues that go along with exit polling. These advantages must be weighed against the potential costs of geographically-based aggregation.

[7] For detailed description of each measure see Appendix A.

Content of state-wide ballot measures

The highest profile measure on the ballot was a referendum on HB 1215, an outright ban on abortion passed by the legislature early in 2006. This legislation garnered national attention, as it was designed as a vehicle for generating a test case that would allow the U.S. Supreme Court an opportunity to overturn the *Roe vs. Wade* decision.[8] The most controversial aspect of the legislation was that it did not allow exceptions for pregnancies caused by rape and/or incest.

In addition to the referendum on the abortion ban, voters evaluated four constitutional amendments and six initiatives. The constitutional amendments included:

a) a ban on civil unions - a measure understood as a fairly expansive effort to further restrict state recognition of homosexual partnerships;

b) a cap on growth in property taxes, combined with a rollback of property assessments - a measure that would especially benefit long-time landowners in areas of rapid development;

c) the creation of a civilian oversight panel to review the decisions of judicial and quasi-judicial officers of the state, and punish those officials judged to have overstepped their mandate; and

d) an amendment proposed by an officially sanctioned technical panel to recommend changes in the operation of the legislature. The proposed changes

[8] See, for example: "National Battle over Abortion Focuses on South Dakota Vote", *New York Times*, November 1, 2006.

included increased compensation of legislators, and a number of rules changes, including a relaxation of the state's open meetings laws.

The initiatives included:

a) a proposed increase in taxes on tobacco products, with revenues to be allocated across health measures, anti-smoking efforts, and the state's general fund;

b) a proposal to prohibit local school boards from beginning the school year prior to August 30; [9]

c) a proposal to allow limited use of marijuana for medicinal purposes;

d) restrictions on the governor's use of the state plane;

e) a repeal of video lottery - a form of state-sanctioned gambling that provides 11% of the state's general fund revenues; and

f) a repeal of the state tax on cell phone providers.

Relative to Snyder (1996), or to assessments of legislative voting behavior, the 11 measures considered here represent a small sample. For the purposes of this study, an assessment of a single election is preferable to Snyder's approach, which pools across multiple elections. One advantage of this approach is that the pool of voters is

[9]This measure was supported by the state's tourism industry, which finds staffing difficult in the late part of the summer.

consistent. Furthermore, the focus on a single election allows the contents of each measure to be considered more carefully.

Put broadly, the measures might be said to encompass 3 main sources of ideological tension:

1) the enforcement of traditional morality vs. individual freedom (i.e. abortion ban, ban on civil unions, medical marijuana, and video lottery);
2) the autonomy of state and local government officials (i.e. cap on property tax growth, limits on the start of the school year, restrictions on the use of the state plane, the oversight panel for quasi-judicial officers of the state, and the amendment to the operations of the state legislature), and
3) the size of state and local budgets (i.e. video lottery repeal, tobacco taxes, cell phone tax repeal, cap on property tax growth).

Divisions might also be expected to appear over the form of revenue collection, as some counties may be more or less exposed to certain taxes, or to social harms associated with phenomena like video lottery or tobacco use.

Election Results

The data are coded as the share of each county's voters favoring each measure. Table 1 reports summary statistics for the cross-county data, using absolute voter turnout at the county level as analytical weights. Turnout-weighted means are a very close approximation of state-wide returns, so the reported means are consistent with aggregate support for each measure.[10]

Voters passed only 3 of the 11 measures: the increase in tobacco taxes, new restrictions on the use of the state plane, and a constitutional amendment banning

[10] They would differ from official returns only to the degree that there are systematic differences across counties in the number of spoiled ballots, or in the number of abstentions on a particular issue. These are not quantitatively significant concerns.

recognition of civil unions. The most popular measure was the increase in tobacco taxes. The final column, which reports the maximum support for each measure at the county level, indicates that only 6 of the 11 measures gained a majority in at least one county.

Cross-county variation in returns is the principal analytic input in what follows, so measures of dispersion are of interest. The ballot measure with the greatest (turnout-weighted) cross-county variance was the proposed cap in property taxes, followed by the referendum on the abortion ban. The measures with the greatest range were the abortion ban and the proposal to allow the use of medical marijuana.

Table 1. Summary statistics: percent voting yes, by county

Ballot Measure	Mean	Std. Dev.	Min	Max
Increase taxes on tobacco products	0.608	0.052	0.327	0.682
Restrict governor's use of state plane	0.554	0.038	0.411	0.642
Ban civil unions*	0.518	0.045	0.347	0.711
Allow medical marijuana	0.477	0.053	0.256	0.675
Ban abortion	0.444	0.064	0.311	0.754
Fix the start of the school year	0.431	0.046	0.312	0.555
Repeal tax on cell phone use	0.394	0.044	0.244	0.450
Repeal video lottery	0.330	0.048	0.217	0.448
Amendments about operation of legislature*	0.324	0.038	0.185	0.450
Cap property tax growth*	0.202	0.069	0.119	0.344
Civilian panel to oversee judges*	0.108	0.041	0.044	0.420

Note: Weighted by absolute voter turnout in each county.
* indicates constitutional amendment.

The next step in the analysis is an evaluation of the cross-county correlations of election returns. As above, absolute voter turnout in each county is used as an analytic weight. If voters viewed the ballot measures independently, we would expect to see relatively low measures of cross-county correlation. Table 2 reports the pairs of measures with correlations greater than 0.5.

Table 2. Highly correlated ballot measures

Ban civil unions* – Allow medical marijuana	-0.797
Ban civil unions* – Ban abortion	0.791
Create civilian panel to oversee judges* – Increase taxes on tobacco products	-0.700
Allow medical marijuana – Ban abortion	-0.670
Repeal video lottery – Repeal tax on cell-phone use	0.634
Amend operation of the legislature* – Repeal tax on cell-phone use	0.616
Amend operation of the legislature* – Allow medical marijuana	0.568
Amend operation of the legislature* – Repeal video lottery	0.539
Increase taxes on tobacco – Repeal video lottery	0.519
Cap property tax growth* – Fix start of school year	0.505

Note: Cross-county variation, with counties weighted by absolute turnout in 2006 election.
* indicates Constitutional amendment

Of the 55 bivariate correlations among the 11 ballot measures, 10 had correlation coefficients greater (in absolute value) than 0.5. Inspection reveals a group of very highly correlated measures: the ban on civil unions, the proposal to allow medical marijuana, and the abortion ban. Relatively high correlation among ballot measures is consistent with the idea that the data can be represented by a reduced number of dimensions. The following section describes this procedure and explains the results.

II. Factor analysis results

Snyder (2005) shows that under assumptions that are common in theoretic modeling of voting behavior, a linear factor model can be used to infer characteristics of voting populations from partially aggregated data on multiple ballot questions. The necessary assumptions are that a) each ballot measure can be described by two points (Yea and Nay) in a multidimensional ideological space, b) all voters have Euclidean preferences, c) voters vote for their most preferred alternative, and d) the distribution of voters' ideal points is multivariate normal.[11] The method involves applying an inverse normal to the percentage approving a ballot measure, and running a factor

[11] Points c) and d) can both be relaxed. One can allow symmetric errors in voters' decisions, and the variance of these errors can vary across ballot measures. The distributional assumptions on voter preferences can also be relaxed, though the analysis that follows employs the normality assumption.

analysis on the associated z-scores.[12] As this analysis employs geographical aggregates with very different numbers of voters, it departs from Snyder. Absolute voter turnout numbers from each county are used as analytical weights in what follows.

A principal components factor analysis returns just three factors with associated eigen values greater than 1. Jointly, these components explain 71 percent of the cross county variation in the transformed election returns. The first column of Table 3 reports the factor loadings on each measure. The signs and magnitudes of the loadings on each measure indicate the nature of cross-county divisions along each factor. The ballot measures have been sorted by the magnitude of loadings on the first factor. Positively signed factor loadings associate increased support for a measure with an increase in the associated factor score. As an interpretive aid, Figure 1 offers a 2-dimensional visual representation of the distribution of county locations in 2-factor space. Ballot measures are represented as axes projected onto the plane, with a short description of each measure indicating the "Yes" direction.

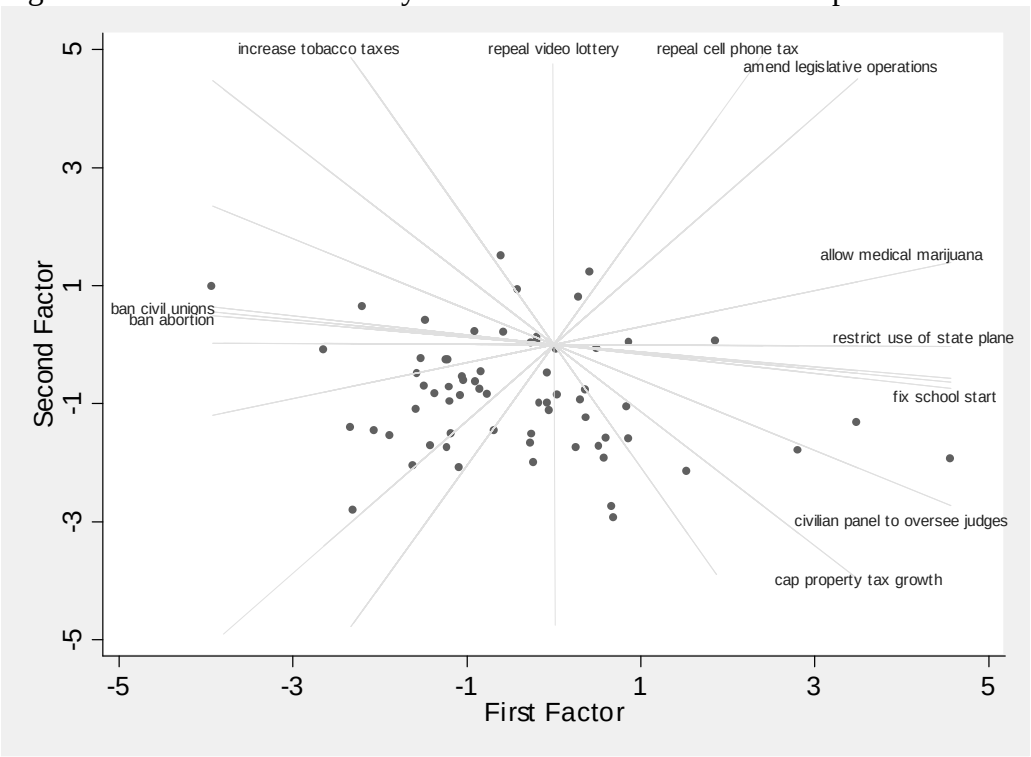
[12] As in Snyder (1996), the absence of extreme values in the election returns means that the transformation has relatively little impact on the analysis. Correlations between the transformed and untransformed variables are always above 0.98.

Table 3. Factor Loadings

	Factor		
Ballot Measure	1	2	3
Allow medical marijuana	0.870	0.265	-0.294
Ban civil unions*	-0.800	0.112	0.476
Ban abortion	-0.789	0.099	0.194
Civilian panel to oversee judges*	0.657	-0.393	0.144
Restrict governor's use of state plane	0.585	-0.004	0.333
Amendments about operation of legislature*	0.510	0.659	0.010
Repeal tax on cell phone use	0.372	0.763	0.075
Cap property tax growth*	0.355	-0.405	0.670
Fix the start of the school year	0.352	-0.057	0.736
Increase taxes on tobacco	-0.350	0.730	0.083
Repeal video lottery	-0.003	0.850	0.297
Associated eigen value	3.564	2.686	1.575
Share of total cross-county variance explained	0.324	0.244	0.143

Note: * denotes proposed constitutional amendment.
The cumulative share of variance explained by first 3 factors is 0.711.

Figure 1. Distribution of county scores in 2-dimensional factor space



As in studies of legislative voting behavior, the primary interest of this study is the first factor. In this analysis the first factor explains substantially less of the observed variation than in legislative studies, but the sign pattern reveals an ideological spectrum nonetheless. Movements in the positive direction along this spectrum (to the right in the figure) tend to indicate greater support for individual

liberty, added restrictions on the autonomy of executive/judicial officials, and reductions in revenues available to the state.[13] Movements in the negative direction (to the left in the figure) generally favor state efforts to enforce traditional morality, fewer restrictions on government officials, and higher revenues for the state.

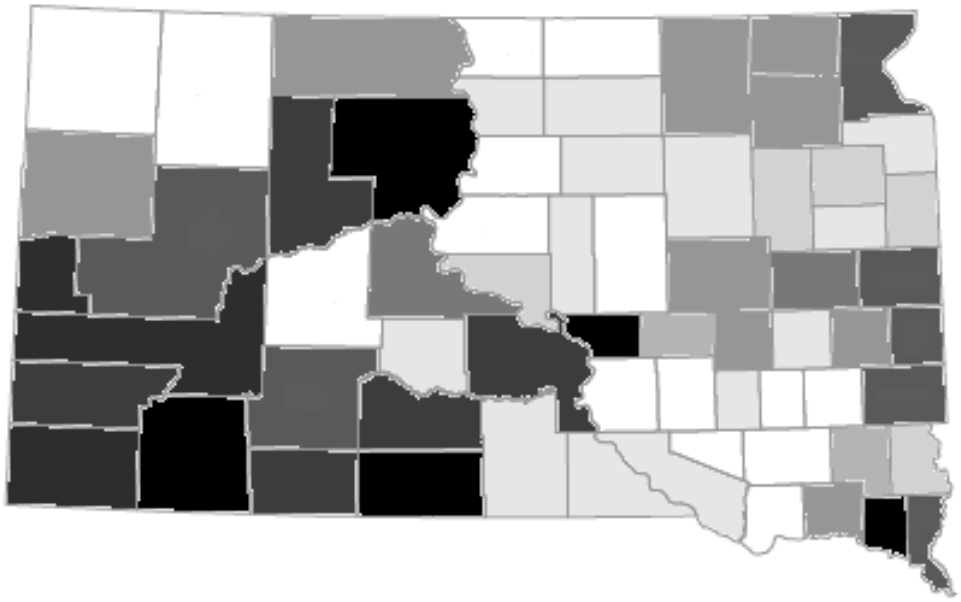
The results in Table 3 indicate that the most divisive measures along the first factor are measures pitting the enforcement of traditional morality against individual freedom. The legalization of medical marijuana use is the most divisive, followed by the proposed bans on civil unions and abortion. Measures affecting the autonomy of public officials follow, while the revenue measures are least divisive along this factor. The relative sizes of the factor loadings and their signs suggest an interpretation of the first factor as a puritan-libertarian spectrum.

Figure 2 shows a mapping of counties' location along this spectrum. County scores are converted into p-values using the cumulative normal distribution, and then grouped by decile. Darker colors represent greater tendency to vote at the libertarian end of the spectrum. A conventional theme in South Dakota political analysis is the tension between a socially conservative East and a libertarian West.[14] While the figure largely bears out this analysis, the correlations that follow will suggest that demographic factors are at least as important as geography.

[13] The video lottery measure cuts this spectrum in a perpendicular manner. This measure cuts across libertarian-puritan spectrum because the libertarian must trade off personal freedom to gamble against an opportunity to substantially cut revenues available to the state, while the puritan must weigh the gains from limiting a form of gambling against the loss of revenue for the state. The amendment to the operations of the state legislature is the most difficult to fit into this framework. The large number of provisions considered in the amendment makes it somewhat to evaluate or interpret.

[14] See, for example, post election analysis in the local press: "Votes reveal two kinds of conservatism," *Rapid City Journal*, November 9, 2006.

Figure 2. First-dimension factor scores



Note: Factor scores for each county were converted to p-values and grouped into deciles. Darker shades imply movement in the libertarian direction.

The secondary factor serves primarily to capture divisions in preferred methods of raising revenues for the government. The largest divisions along this dimension were on the video lottery repeal, followed by the cell phone and tobacco tax measures. The technical amendment on the role of the legislature also reflects divisions along the first factor. The most influential measures for determining 3rd-factor scores are the measures intended to cap property taxes and to limit school boards' authority to set the beginning of the school year. Both these issues are of economic significance to the Black Hills region in the state's west.[15]

The primary advantage that comes with use of county level returns is that county voting behavior can then be linked to a wealth of demographic and economic data available at the county level. These data include voter registration figures from State of South Dakota, demographic data from U.S. Census Bureau and religious

[15] The property tax cap would benefit incumbent landowners, and this region had seen rapid increases in rural land values. The area is also highly dependent on tourism revenues, and small businesses in that sector supported a later start to school year so that youth labour would be available for the entirety of the tourist season.

affiliation data from Jones et al (2002).[16] Table 4 reports these correlations. Because the demographic variables apply to the county's entire population, not just the sub-sample that voted, these correlations must be interpreted with care. The correlations link characteristics of county populations as a whole to election returns; they do not necessarily imply that particular well-represented sub-populations are voting in a particular manner.

Table 4. Correlations with county demographics

	Factor		
Demographic measures	1	2	3
Median age (2005)	-0.595	-0.352	0.191
Share of population receiving Social Security (2004)	-0.572	-0.443	0.225
Organized church adherents/population (2000)	-0.550	0.005	0.034
Per capita earnings from state and local government payrolls (2004)	0.507	-0.254	-0.136
Republican share of registered voters (2006)	-0.494	-0.031	0.151
Per capita evangelical church adherents (2000)	-0.494	-0.006	0.359
Native American share of population (2005)	0.445	-0.462	-0.035
Dummy variable: counties west of the Missouri River	0.414	-0.491	0.416
Per capita mainline protestant adherents (2000)	-0.412	0.226	-0.230
Dummy variable: counties in the Black Hills region	0.382	-0.251	0.561
Population (2005)	0.367	0.681	0.045
Share of population with college education (2000)	0.364	0.557	-0.339
Square miles per capita (2005)	-0.287	-0.610	-0.105
Share of residents in poverty (1999)	0.287	-0.583	-0.060
Democratic share of registered voters (2006)	0.256	-0.135	-0.208
Per capita Catholic adherents (2000)	-0.193	-0.220	0.040
Per capita income (2004)	-0.148	0.536	-0.078
Share of population enrolled in elementary and secondary education (2005)	-0.112	-0.651	0.041
Population growth, 2000-2005	0.057	0.387	0.020
Female share of population (2005)	0.057	0.011	-0.118
Per capita federal spending (2004)	-0.047	-0.534	-0.211

The evidence in Table 4 suggests that the strongest relationship between county scores in the first dimension and the collection of demographic variables is the negative correlation with counties' median age. A secondary measure of age, the share of population receiving social security, is similarly correlated with first

[16]South Dakota data on religious affiliation was downloaded from the Association of Religion Data Archives, www.TheARDA.com, an archival site for the Jones et al (2002) data.

dimension factor scores. Voters in older counties are more likely to favor greater action to impose traditional standards of morality, to allow greater autonomy for executive/judicial officials, and to provide revenues for the operation of state and local governments.[17] Counties voting this way also tend to have high levels of church adherence, low levels of income from state and local government payrolls, and high levels of Republican voter registration.

The second factor, which reveals divisions over methods for financing state government, appears to reflect divisions between high and low population counties. Per capita income measures are also highly correlated with 2nd-factor scores. Counties with larger populations and larger per capita incomes tended to prefer the repeal of video lottery and the tax on cell phone providers, but favored an increase in tobacco taxes. Demographic correlations were considerably weaker along the third dimension. A dummy variable for the Black Hills region was the variable most highly correlated with these factor scores.

III. The issue space and elected office

Votes on the 11 ballot measures coincided with two prominent state-wide election campaigns. South Dakota's governor, Michael Rounds, was re-elected with 62 percent of the vote. The state's at-large Democratic Congresswoman, Stephanie Herseth, was re-elected with 69 percent of the vote. The coincidence of state-wide elections with these ballot measures allows a comparison of voters' policy attitudes, as measured by their responses to the ballot measures, and their support for candidates for elected office.

[17] The relevance of the median age variable is especially notable, as South Dakota has been ageing rapidly in recent years. The state's median age was 32.4 in 1990, and 37 in 2005, an increase of 4.6 years in 15. The coefficients from regressions of county level support for each ballot measure on median age alone suggest that, if all counties' median ages were reduced by 4.6 years, the medical marijuana measure would have passed, and the ban on civil unions would not have passed. Demographic changes since 1990, it would seem, have shifted state-wide voting behavior in the puritan direction, with substantive consequences for law and policy.

Under the maintained hypothesis that counties' component scores represent latent positions in ideological space, county-level vote shares in support of re-election of these two officials are regressed on counties' principal component scores. As before, absolute voter turnout is used as an analytic weight. The results are reported in Table 5.

Table 5. Predictive power for state-wide elections

Share voting to re-elect	Factor score			Variation explained by factors…		
	1	2	3	1	1, 2	1-3
Governor Michael Rounds (R)	-0.058* (0.005)	-0.008 (0.005)	0.007 (0.005)	0.747	0.760	0.770
Congresswoman Stephanie Herseth (D)	0.013* (0.006)	0.007 (0.005)	-0.029* (0.009)	0.062	0.080	0.373

Note: Turnout-weighted regression of share voting for each incumbent on component scores.
* indicates significance at the 5% level. Factor scores are orthogonal so coefficient estimates are independent of the number of regressors included. Reported standard errors are from the regression including all 3 component scores as regressors. The residuals from those two regressions have a correlation coefficient of -0.3078. The null hypothesis that these are independent is rejected at a 5% significance level. This indicates that even after controlling for the 3 factors that capture "ideology", consistent cross county differences in support for these two candidates remain.

The evidence suggests that votes in the gubernatorial race were determined largely by voters' ideological position along the puritan-libertarian scale. Along the first factor, each one point increase in the county's z-score (a one standard deviation movement in the libertarian direction) reduces the share of votes in favor of the governor's re-election by almost 6 percentage points. Three-fourths of the cross-county variation in the share voting to re-elect the governor is explained by this variation along this one dimension. By contrast, the joint contribution of the remaining 2 factors explains only an additional 2 percent of the overall variation in support for the Governor's re-election. These results suggest that the voters' policy positions, as revealed by the best 1-dimensional representation of their votes on the policy measures, are quite informative as to their vote for the most prominent state-wide office.

By contrast, votes for the re-election of at-large Congresswoman Stephanie Herseth were not closely associated with counties' factor scores. While the coefficient on the first dimension score is statistically significant, the effect is small. Variation in first dimension factor scores explains a mere 6 percent of the cross-county variation in voters' support for the Congresswoman's re-election. The most relevant axis for this race was the third factor, which explained 29 percent of the cross-county variation in the race. A one point increase in county z-scores along this dimension reduces support for Congresswoman Herseth by 2.9 percentage points.

The most likely explanation for the greater explanatory power of component scores in the gubernatorial race than in the Congressional race is that these ballot measures capture policy attitudes on state, not federal, issues. If policy attitudes at the state level are not closely correlated with attitudes on federal issues, one would not expect factor scores to explain votes for federal office. While it is surprising that the governor's race could be captured so neatly by the first factor, it may not follow that the Congressional race should fit that pattern.[18]

IV. Conclusion

Formal dimension reduction techniques have been used to isolate policy attitudes in studies of legislative voting behavior and in exit polls. This paper applies a related technique to state ballot measures in the 2006 South Dakota general election. Unlike the literature on legislative voting behavior, the first factor in this study cuts across the standard conservative-liberal spectrum. Instead, a puritan-libertarian description of the ideological spectrum seems more appropriate.

[18] It may also be that the personalities in the Congressional race cut across standard ideological divides. Congresswoman Herseth is viewed as a centrist Democrat, and this might explain relatively strong support in socially conservative counties. Her Republican opponent, Bruce Whalen, is a Native American, and may have polled better than might have been expected in traditionally Democratic counties with large Native American shares of population. These counties might have gone even more heavily for the Congresswoman had she run against a non-Native candidate.

While the behavior of individual voters cannot be isolated here, this analysis allows a straightforward link between demographic characteristics and county-level voting behavior. Counties' median age is the variable most highly correlated with component scores along the first dimension. Counties with older populations tend to be more supportive of an active state. The second dimension, which measures different preferred funding options for state government, is highly correlated with measures of county population and per capita income.

Regressions of electoral support for incumbent state-wide officeholders on counties' component scores suggest that cross-county variation in support for the re-election of the governor was largely determined by a county's first-dimension factor score. Votes in the gubernatorial race appear to largely have been driven by ideological divisions, not campaign tactics or personalities. The same cannot be said of the at-large Congressional race, in which component scores explained little of the variation in support for re-election of the incumbent.

The methods used here offer an alternative to exit polls when the purpose of the study is identifying voters' policy attitudes, linking such attitudes to demographic characteristics, and isolating the effect of policy attitudes on votes for elected officials. The aggregation of voters by county makes some interpretive statements difficult, but geography remains a sensible first unit of aggregation in election analysis, for it governs the extent of media markets, organizing efforts, and many social, political and economic relationships. The method described here can only be applied to state issues and in states with direct democracy. South Dakota's high voter turnout may generate stronger relationships between election returns and population characteristics than would appear in data from other states. In this election, it appears that the ideological and demographic characteristics of counties are linked to election

returns. The primary axis revealing divisions among voters on ballot measures also appears to have considerable influence in determining county level returns in a prominent race for state-wide office.

Bibliography

Aldrich, John and James Batista (2002) "Conditional Party Government in the States," *American Journal of Political Science* 46(1): 164-172.

Bowler, Shaun and Todd Donovan (2002) "Democracy, Institutions and Attitudes about Citizen Influence on Government," *British Journal of Political Science*, 32: 371-390.

Gay, Claudine (2007) "Legislating Without Constraints: The Effect of Minority Districting on Legislators' Responsiveness to Constituency Preferences," *Journal of Politics* 69(2): 442-456.

Gerber, Elisabeth and Jeffrey Lewis (2004) "Beyond the Median: Voter Preferences, District Heterogeneity, and Political Representation," *Journal of Political Economy* 112(6): 1364-1383

Jones, Dale E., Sherri Doty, Clifford Grammich, James E. Horsch, Richard Houseal, Mac Lynn, John P. Marcum, Kenneth M. Sanchagrin, and Richard H. Taylor (2002) *Religious Congregations and Membership in the United States 2000: An Enumeration by Region, State and County Based on Data Reported by 149 Religious Bodies*, Nashville, Tenn.: Glenmary Research Center.

Kousser, Thad, Jeff Lewis and Seth Masket (2007) "Ideological Adaptation? The Survival Instinct of Threatened Legislators," *Journal of Politics* (forthcoming).

McCarty, Nolan, Keith Poole and Howard Rosenthal (2006) *Polarized America: The Dance of Ideology and Unequal Riches*, Cambridge: MIT Press.

Nicholson-Crotty, Sean and Kenneth Meier (2002) "Size Doesn't Matter: In Defense of Single-State Studies" *State Politics and Policy Quarterly* 2(4): 411-422.

Poole, Keith (1998) "Recovering a Basic Space From a Set of Issue Scales" *American Journal of Political Science*, 42(3), 954-993.

Poole, Keith and Howard Rosenthal (1985) "A Spatial Model for Legislative Roll-Call Analysis," *American Journal of Political Science* 29(2): 357-384.

Poole, Keith and Howard Rosenthal (1991) "Patterns of Congressional Voting," *American Journal of Political Science*, 35(1): 228-278.

Poole, Keith and Howard Rosenthal (1997) *Congress: A Political-Economic History of Roll Call Voting*, New York: Oxford University Press.

Shor, Boris, Christopher Berry and Nolan McCarty (2007) "A Bridge to Somewhere: Mapping State and Congressional Ideology on a Cross-Institutional Common Space" *mimeo,* University of Chicago.

Snyder Jr., James M. (1996) "Constituency Preferences: California Ballot Propositions 1974-1990," *Legislative Studies Quarterly*, 21 (4), 463-488.

Snyder Jr., James M. (2005) "Estimating the Distribution of Voter Preferences Using Partially Aggregated Voting Data," *The Political Methodologist*, 13(1), pp. 2-5.

Appendix A. Description of ballot measures

This appendix provides a short description of each ballot measure, along with the election outcome. Quoted language in this appendix is excerpted from the South Dakota Attorney General's explanation of each ballot measure.[19]

Constitutional Amendments

Amendment C "would allow and recognize marriage only between a man and a woman. It would also prohibit the Legislature from allowing or recognizing civil unions, domestic partnerships or other quasi-marital relationships between two or more persons regardless of sex." *Passed with 52% voting Yes*

Amendment D "would base the taxable value of property upon 'acquisition value' for property sold after January 1, 2007. The Legislature may authorize the assessed value of such property to be annually adjusted by up to three percent, using the 2003 assessed property valuation as the base year." *Failed with 80% voting No*

Amendment E "would allow thirteen special grand jurors to expose (citizens serving on juries, school boards, city councils, county commissions, or in similar capacities, and prosecutors and judges) to fines and jail, and strip them of public insurance coverage and up to one-half of their retirement benefits, for making decisions which break rules defined by the special grand jurors." *Failed with 89% voting No*

Amendment F "includes recommendations by the Constitution Revision Commission." These include multiple issues the nominated advocate described as a "clean-up" of the Constitution.

[19] The official South Dakota State pamphlet on 2006 ballot measures, which includes succinct arguments for and against each proposal, is available at http://www.sdsos.gov/electionsvoteregistration/electvoterpdfs/2006SouthDakotaBallotQuestionPamphlet.pdf (accessed December 6, 2007).

The nominated opponent argued that most components were reasonable, but objected to a proposed change that would allow the legislature to close some meetings to the public. *Failed with 68% voting No*

Initiatives

Measure 2 "would increase taxation on tobacco products sold in the state." The measure also specifies the use of revenues under various circumstances. *Passed with 61% voting Yes*

Measure 3 "would prohibit local school boards from establishing the start of a regular school term prior to the last day of August." *Failed with 57% voting No*

Measure 4 "allow persons, including minors with parental consent, with a debilitating medical condition, to be certified to grow (not more than six plants), possess (not more than one ounce) and use small amounts of marijuana for medical purposes." *Failed with 52% voting No*

Measure 5 "requires aircraft owned or leased by the State to be used only for state business, with no exceptions." *Passed with 55% voting Yes*

Measure 7. "During the last year, the State received approximately one hundred twelve million dollars… from video lottery which is 11% of the state general fund budget. The proposed law would repeal video lottery and eliminate this source of revenue." *Failed with 67% voting No*

Measure 8. "State laws impose a four percent tax on the gross receipts of companies providing wireless telecommunications (cell phone) services instead of a property tax. Last year the State received approximately eight and one-half million dollars …from the cell phone tax. Forty percent (40%) of these revenues are distributed to counties based on population; the balance goes to the State. The proposed law would repeal this tax, and eliminate this source of revenue." *Failed with 61% voting No*

Referred Law 6

"House Bill 1215 would prohibit any person, at any time, from providing any medicine or other substance to a pregnant woman for the specific purpose of terminating her pregnancy."…"A vote 'Yes' will allow the Act to become effective. A vote 'No' will reject the Act." *Failed with 56% voting No*