THE STABILITY OF VOTER PREFERENCES IN TWO SOUTHERN STATES: AN ANALYSIS OF PANEL DATA WITH ATTRITION

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Every four years millions of Americans spend considerable amounts of their time, energy, and money to influence the choice of the next President. The cost of this choice is enormous, especially during the three or so months of campaigning following the selection of candidates at the major party conventions. Given the social and political importance accorded these collective decisions, one needs to ask an obvious question: are a sufficient number of preferences changed over the course of the campaign to make a difference in the outcome?

The research pertaining to the problem of changing voter preferences during election campaigns is relatively sparse. The only major study by Berelson, Lazarsfeld, and McPhee is based on a sample of a single community in upstate New York during the 1948 election. [1] Its findings are based on a multi-wave panel design, and the analysis in most cases uses only part of the total data. Such panel designs have several attractive features, including the ability to analyze gross (individual) as well as net (marginal) change and the added power of inference derived from repeated measurements on the same respondent, but their major statistical drawback is one of uncontrolled attrition. Even the best planned and executed design cannot obtain complete information on all individuals for each time period. Such factors as cost, time, the mobility of the respondent, and his overall cooperativeness operate to produce incomplete data on some individuals for selected time periods. The more common analytical choice when confronting incomplete panel data is to analyze only a subset of respondents with more or less complete data, although a unified approach using the total information available would be more desirable. We shall present such an approach based on the general linear analysis of categorical data originally introduced by Grizzle, Starmer, and Koch called the "supplemented marginals" approach. [4] This technique is designed to test hypotheses about net (marginal) change across time periods even where data may be incomplete for some respondents. The example presented below is based on two three-wave panel designs administered during the 1968 presidential election campaign in Florida and North Carolina.

The Supplemented Marginals Approach

In a three-wave panel design seven combinations of data are possible. One type represents the situation of complete information while the other six types have some form of incomplete data. In most applications, the supplemented marginal approach treats each of the seven types of data as distinct subpopulations, within which certain relevant functions can be defined. Next, one constructs appropriate estimates of these functions and their associated variance-covariance matrix. Finally, statistical tests are undertaken to determine whether the estimates of such functions from the respective subpopulations may be regarded as having come from the same underlying population. In effect, one is asking whether the factors influencing the occurrence of missing data for some respondents and not others is related to the functions of interest.

For the sake of brevity, the approach will be illustrated for the sample data used in the example. Because of the design of the survey, only three patterns of data were present: respondents interviewed (1) at all three time periods, (2) at the first two time periods, and (3) at the first period only. However, it will be apparent from the generality of the discussion that this same methodology is applicable to those situations where other patterns of missing data are present. For additional details in this respect, the reader is referred to Koch, Imrey, and Reinfurt. [5]

The data for each state may be arrayed into a complex contingency table having 3 rows (subpopulations) and 64 columns. The first subpopulation has 64 possible combinations of response, resulting from a four level response (Humphrey, Nixon, Wallace, and Don't Know) measured at three time periods ($4^3 = 64$). The second subpopulation has only 16 possible combinations resulting from measurement only at times 1 and 2 ($4^2 = 16$). Finally, the third subpopulation has four combinations ($4^1 = 4$).

Three functions are of interest for characterizing the net level of preference for each candidate at each time period. These functions are as follows:

$$f_{t,1} = \log_e \{\frac{H}{N}\}$$

$$f_{t,2} = \log_e \{\frac{W}{H + N}\} \qquad (2.1)$$

$$f_{t,3} = \log_e \{\frac{D}{H + N + W}\}$$

where t = (1, 2, 3) and H = the proportion preferring Humphrey, N = the proportion preferring Nixon, W = the proportion preferring Wallace, and D = the proportion undecided.

These log-linear functions of the response data may be constructed by application of the categorical data analysis approach by the selection of the appropriate $\underset{\sim}{A}$ and $\underset{\sim}{K}$ matrixes. These matrices define 18 functions of interest, 9 for the subpopulation with complete data, 6 for the second subpopulation, and 3 for the third. For the second subpopulation, the 3 functions for the third time period (November) are undefined; for the third subpopulation, the 6 functions for October and November are undefined.

A supplemented marginals model was used to determine whether the 18 functions could be accounted for by 9 parameters (2.2). These nine

$$\underset{(18\times 9)}{X} = \begin{bmatrix} 1&0&0&0&0&0&0&0&0 \\ 0&1&0&0&0&0&0&0&0 \\ 0&0&1&0&0&0&0&0&0 \\ 0&0&0&1&0&0&0&0&0 \\ 0&0&0&0&1&0&0&0&0 \\ 0&0&0&0&0&1&0&0&0 \\ 0&0&0&0&0&0&1&0&0 \\ 0&0&0&0&0&0&0&1&0 \\ 0&0&0&0&0&0&0&0&1 \\ 1&0&0&0&0&0&0&0&0 \\ 0&1&0&0&0&0&0&0&0 \\ 0&0&1&0&0&0&0&0&0 \\ 0&0&0&1&0&0&0&0&0 \\ 0&0&0&0&1&0&0&0&0 \\ 0&0&0&0&0&1&0&0&0 \\ 1&0&0&0&0&0&0&0&0 \\ 0&1&0&0&0&0&0&0&0 \\ 0&0&1&0&0&0&0&0&0 \end{bmatrix} \quad \text{and} \quad \underset{(9\times 1)}{b} = \begin{bmatrix} b_{1,1} \\ b_{1,2} \\ b_{1,3} \\ b_{2,1} \\ b_{2,2} \\ b_{2,3} \\ b_{3,1} \\ b_{3,2} \\ b_{3,3} \end{bmatrix} \qquad (2.2)$$

parameters represent the three candidate comparisons of interest for each of the three time periods. The remaining 9 degrees of freedom excluded from the supplemented marginals model provide means for testing the goodness-of-fit (GOF) of the model (2.2). This GOF test provides a comparison between the 18 observed values with the 18 values predicted by (2.2). When this test is not significant, one may interpret the results to mean that the model adequately characterized the data, or in other words, that the factors affecting the occurrence of missing data, in general, have not operated to make the estimated values of the functions from the various subpopulations different. When the test is significant however, it is evidence that the subpopulations are not homogeneous--that is, the estimates of the functions for each of the three subpopulations are statistically different.

When the model described in (2.2) was fitted to the statewide sample data for Florida and North Carolina, the GOF tests were significant in both cases, indicating that the factors affecting whether a respondent was interviewed once, twice, or three times were in some way related to candidate preferences.

When such a situation arises, the best strategy is to define subpopulations of interest that may adequately characterize the factors affecting the occurrence of missing data. Since the first wave of the sample was measured by a household interview while the second and third waves were completed by telephone, we suspected that occupation of the head of the household would be an efficient indicator for characterizing the likelihood of being reached by telephone for a reinterview. Also, we hypothesized that the race of the respondent would significantly affect the chance for a reinterview. These two factors together, no doubt, efficiently characterize such factors as social class, place of residence, and income that would affect one's chance for reinterview. As a result, each state sample was further stratified by race and occupation. Because the number of black respondents in each sample was small, only white respondents were further classified by six levels of occupation as follows:

WC	white; white collar and professional
SBM	white; small businessmen
SBC	white; skilled blue collar worker
UBC	white; unskilled blue collar worker
F	white; farmer or tenant worker
R	white; retired
B	black; --

These seven race x occupation subpopulations were defined for each of two states creating a total of 14 subpopulations. Within these 14 subpopulations were three further divisions--interviewed three times, interviewed twice, and interviewed once. Thus, a total of 42 distinct subpopulations were created. The initial task was then to fit the supplemented marginals model (2.2) to each of the 14 subpopulations defined by state, race, and occupation.

Only one of the 14 GOF tests was significant at the $\alpha = .10$ level (that is, white professionals in North Carolina), and we concluded that these supplemented marginal models provided an appropriate description of the data from the 14 subpopulations. Some further justification for this decision will be given in the next section. Otherwise, it should be recognized that those subpopulations where the fit is judged not to be satisfactory could be subdivided into smaller, and more homogeneous, aggregates within which better fits of the supplemented marginals model could be anticipated. Because of sample size requirements however, there are certain limits on the amount of subpopulation partitioning that may be done. Hence, a point is eventually reached where goodness-of-it and sample size criteria must be compromised. In sum, one must formulate a set of subpopulations that are of interest and make a decision as to whether the supplemented marginal model is appropriate to them.

Combining the Supplemented Marginals Models

Given the acceptable GOF test for the 14 state x race x occupation subpopulations, one may be interested in the importance of these three effects on the level of candidate preferrences. We shall discuss the approach whereby state and time effects may be examined, although the method is general, and therefore, may be used to study race and occupation effects as well.

Each of the 14 models reported in the previous section has a 9-vector of parameters ($\underset{\sim}{p}_{ij}$) and a corresponding variance-covariance matrix ($\underset{\sim}{V}_{ij}$ where $i = 1, 7$; $j = 1, 2$). These 14 sets of parameters and variance matrices may be used to fit further models designed to characterize the importance of state, time, race, or occupation. In the case of state and time effects, the corresponding sets of parameters and variance matrices for each race x occupation group i may be combined in the following manner:

$\underset{\sim}{F}_i \hat{=} \underset{\sim}{x}_2 \underset{\sim}{b}_2$ where "$\hat{=}$" means "is estimated by",

$$\underset{(18 \times 1)}{\underset{\sim}{F}_i} = \begin{bmatrix} \underset{\sim}{P}_{i\,1} \\ \underset{\sim}{P}_{i\,2} \end{bmatrix}, \quad \underset{(18 \times 18)}{\underset{\sim}{V}_i} = \begin{bmatrix} \underset{\sim}{V}_{i1} & \underset{\sim}{0} \\ \underset{\sim}{0} & \underset{\sim}{V}_{i2} \end{bmatrix}$$

with $\underset{\sim}{0}$ being a 9 x 9 matrix of zeroes.

Thus, $\underset{\sim}{F}_i$ is the vector of parameters for race x occupation class i for both Florida and North Carolina; $\underset{\sim}{V}_i$ is the appropriate variance matrix for $\underset{\sim}{F}_i$. The corresponding model $\underset{\sim}{X}_2$ includes state effects, time effects, and state x time interaction effects for each of the three candidate comparison functions.

The resulting GOF and test statistics provide criteria for decisions reducing the original model $\underset{\sim}{X}_2$ in a manner that efficiently characterizes the important sources of variation.

The models fitted for each of the seven race x occupation classifications produce predicted values for the functions defined in (2.1). These values may be transformed into the proportion preferring each candidate at the three time periods since

$$a = \log_e \{\frac{H}{N}\},$$

$$b = \log_e \{\frac{W}{H+N}\}, \text{ and}$$

$$c = \log_e \{\frac{D}{H+N+W}\} \text{ imply that}$$

$$P(\text{Nixon}) = 1 / k,$$

$$P(\text{Humphrey}) = e^a / k,$$

$$P(\text{Wallace}) = e^b (1 + e^a) / k,$$

$$P(\text{Undecided}) = e^c (1 + e^b) (1 + e^a) / k, \text{ and}$$

$$k = (1 + e^a) (1 + e^b) (1 + e^c).$$

The estimates of the level of preference for the three candidates are reported in Table 1.

TABLE 1

PROBABILITIES OF PRESIDENTIAL CANDIDATE PREFERENCE (1968) DERIVED FROM REDUCED MODELS BY RACE AND OCCUPATION SUBPOPULATIONS

		WC	SBM	SBC	UBC	F	R	B
FLORIDA								
SEPTEMBER	Nixon	.383	.249	.217	.189	.285	.367	.070
	Humphrey	.147	.166	.123	.111	.082	.216	.726
	Wallace	.290	.457	.488	.556	.462	.234	.037
	Undecided	.180	.128	.172	.144	.171	.183	.167
OCTOBER	Nixon	.402	.249	.263	.204	.285	.367	.070
	Humphrey	.159	.166	.148	.112	.082	.216	.726
	Wallace	.260	.457	.460	.531	.462	.234	.037
	Undecided	.180	.128	.129	.144	.171	.183	.167
NOVEMBER	Nixon	.359	.249	.310	.189	.285	.367	.070
	Humphrey	.230	.166	.175	.111	.082	.216	.726
	Wallace	.231	.457	.420	.556	.462	.234	.037
	Undecided	.180	.128	.095	.144	.171	.183	.167
NORTH CAROLINA								
SEPTEMBER	Nixon	.383	.232	.217	.254	.230	.367	.070
	Humphrey	.147	.156	.140	.150	.167	.216	.726
	Wallace	.290	.484	.514	.492	.432	.234	.037
	Undecided	.180	.128	.129	.104	.171	.183	.167
OCTOBER	Nixon	.402	.249	.288	.289	.275	.367	.070
	Humphrey	.159	.166	.124	.170	.035	.216	.726
	Wallace	.260	.457	.460	.397	.519	.234	.037
	Undecided	.180	.128	.129	.144	.171	.183	.167
NOVEMBER	Nixon	.359	.265	.284	.313	.315	.367	.070
	Humphrey	.230	.177	.183	.184	.081	.216	.726
	Wallace	.231	.429	.405	.306	.432	.234	.037
	Undecided	.180	.128	.129	.198	.171	.183	.167

Some Comments on the Effects of 1968 Campaign

These sample data provide evidence that the election campaign as applied to the electorate of these two southern states had no significant political effect. In fact, one can be impressed by the durability of net candidate preferences among almost all sectors of the voters. Except for Unskilled Blue Collar Workers in North Carolina, the candidate who enjoyed a plurality in September at the formal beginning of the campaign maintained his plurality through the campaign to election day. Although one can find statistically significant time effects among several classes and states, these time effects had no important consequences. The general trend of these campaign effects, however, is a slight loss of support for Wallace and some gain for Nixon. When one compares the magnitude of the X^2 associated with the time parameters with other effects though, one can conclude that the amount of variation associated with these parameters is relatively small. We should emphasize, however, that when we stress the lack of campaign (time) effects on these two state electorates, we are speaking about the net effect of possibly many individual changes. It is in this sense that we can say that the campaign made no political difference.

The election in Florida and North Carolina was between Nixon and Wallace. Although black voters overwhelmingly supported Humphrey, white voters supported either Nixon or Wallace. Two other studies support these findings--one in Tennessee [2] and the other nationally [3]. Nixon gained his support from the White Collar, Professional, and Retired workers, while Wallace held a broad base of support among all other classes--Small Businessmen; Blue Collar-Workers, skilled and unskilled; and Farmers. In the one case where the campaign made a politically significant difference (Unskilled Blue Collar Workers in North Carolina), Wallace lost his plurality and Nixon gained. Humphrey was never a serious contender in these two states, for his only sizable basis of support was among blacks.

Finally, one finds little evidence for the importance of different state "political cultures" on the stability of voter preferences [6]. One might anticipate "state" effects to occur from the many cultural and historical differences that make Florida different from North Carolina with respect to how people decide their choice for President. These state effects though unspecified would be characterized by significant "main effects" for state. No statistically significant state effects were found however. Thus, our findings give little support to the theory that state electorates differ markedly in their political processes (with respect to the level and stability of candidate preferences).

There is a more limited sense, however, in which state differences do appear. The relatively minor time effects are, in fact, different for each state within certain race x occupational classifications. The most dramatic example is for Unskilled Blue Collar workers: although Wallace maintained his plurality in Florida, he lost it in North Carolina. Other lesser examples of state x time effects may also be found for Small Businessmen, Skilled Blue Collar Workers, and Farmers. White Collar Workers and Professionals, Retired Workers, and Blacks, however, show no variations based on time within state.

In conclusion, let us stress that our analysis has focused on net political preferences and not political behavior. We have determined the level of choice for each of the major candidates in the 1968 election and not the proportion of the actual vote. Clearly, different race and occupational groups vote at different rates, and there is no direct relationship between preference and voting. Thus, one can anticipate slight discrepancies between the predicted levels of preference and election outcomes.

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