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An Application of Principal Components Analysis to Voting in Scottish Municipal Elections 1967-9

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This paper uses Principal Components analysis to investigate voting, particularly voting for the Scottish Nationalist Party, in 84 municipal wards of four Scottish cities–Aberdeen, Dundee, Edinburgh and Glasgow.

1. Introduction

This study originated as an enquiry into the social character of electoral support for the Scottish National Party (S.N.P.). We wished to see whether this support conformed to either traditional left or right voting.

Our choice of Principal Component Analysis was dictated by our decision to include as many relevant variables as possible from the ward census data (1966 census).

Traditionally, studies of electoral behaviour emphasize the contribution of social class, age and sex in influencing voting choice; these factors usually being presented as unweighted percentages of the total vote in terms of their relative contribution to differences in voting between social classes, sex and age groups. But we wished to include other possibly relevant variables such as owner occupation/renting from the council, employment in manufacturing/service industries, and to examine their contributions to voting patterns within a weighted standardized structure.

Problems in sociology are usually multivariate and it is necessary to investigate and represent the inter-relations between the variables. It is usual to consider the correlation coefficients between the observed values, but, unless most of the non-diagonal elements of the correlation matrix are small, it can be fruitless to simply look at the correlations. Perhaps the worst danger is that it is easy to find evidence to support any preconceived ideas by looking at only one facet of the information.

In our case, examination of the correlation matrices (Appendix A) confirm that nearly all the variables are significantly correlated, and that an investigation into the social sources of S.N.P. support requires a multivariate technique. The importance of census data in the study of voting behaviour in the 1970 general election with applications of Principal Component Analysis and Regression Analysis have since been discussed by Crewe and Payne in Appendix III of Butler and Pinto – Duchinsky (1970).

2. Method

Factor analysis and Principal Component analysis have been discussed by Ehrenberg (1962), Lawley and Maxwell (1962 and 1963). Jeffers (1967) gives case studies of the latter technique and lists eight reasons for using Principal Component analysis, for us four are relevant:

(i) the examination of the correlations;

(ii) the reduction of the dimensionality;

(iii) the elimination of variables which contribute little extra information;

(iv) the orthogonalisation of the components.

Our choice of component analysis is justified by (iv) alone, because we wished to compare S.N.P. voting with left and right voting and also to investigate the feasibility of estimating percentage votes from census data, by means of regression analysis; the regression being estimated separately for S.N.P. and the others on the components for each city and each year.

Jeffers also calls for the technique to be more widely applied and reported. so that its value can be assessed in practice. It is in this spirit that our paper has been prepared. In one of the authors' opinion (S.V.L.), the model examples in text books, which have two or three easily identified components, are misleading, because in a substantial proportion of the applications of P.C.A. there are too many components which are difficult to interpret meaningfully. In sociological work, this might be due to including too many variables without sufficient attention to defining the problem under investigation.

The computer programs used were 02 M and 03 R of the B.M.D. package Dixon (1968) which have been adapted for the I.C.L. 4130 at Portsmouth.

3. Specification of Variables

The source of our information was the Registrar General's 10% sample ward census sheets (1966). We were restricted to a total of 20 variables, at the time, because of limitations of the programs. The "X" variables selected age, sex and class, are standard in studies of voting behaviour, e.g. Moser and Scott (1961), Butler and Stokes (1969) and Abrams and Rose (1960). To these were added new elements such as owner-occupation, renting from the council, and percentage in manufacturing and service industries, in order to show a component structure indicating types of milieux. Recent work by Lockwood (1966) and Goldthorpe (1963) and (1969) suggests that social milieux, in the sense of occupational and community environment, is an important mediating influence in the formation and consolidation of social attitudes and imagery, and this work has been applied by Piepe et al (1969).

The fifteen "X" variables in the order that they appear in the correlation matrices are given below: each set of observations relating to a particular ward of a city.

% Poll, percentage of the electorate voting;

S.E.G. 3, percentage of self employed and professional workers in socio-economic groups, (S.E.G.'s) 3 and 4;

S.E.G. 1, percentage of employers and managers in S.E.G.'s 1 and 2;

S.E.G. 8, percentage of Manual supervisors, skilled workers and the self-employed not requiring training of degree standard in S.E.G.'s 8, 9, 12, 14;

S.E.G. 5, percentage of intermediate and junior non-manual workers in S.E.G.'s 5 and 6;

S.E.G. 7, percentage of semi-skilled workers, including service and agricultural workers in S.E.G.'s 7, 10 and 15;

S.E.G. 11, percentage of unskilled workers and others.

The other variables comprise: % owner-occupiers; % renting from the council; % in manufacturing industry; % in service and distibution industries; % in age group 30-44, % in age group 65+; % male. We did not include S.N.P., right or left voting because these are our dependent variables; the Registrar General's social class index was omitted because it overlapped with the socio-economic groups; and certain age groups and females were not included because of redundancy. In addition there were certain fringe classifications which we found to be unimportant. For example, local government officers were too small a group to matter, and statistical analysis showed that populations changes had no effect on changes in voting patterns. It must be stressed that, with the exception of % poll, our selection of variables was limited to those available on the census sheets.

4. Correlation Matrices

As might be expected the matrices were highly consistent from year to year for each city and we have therefore shown only the matrices for 1968 in appendix A. There is not only little variation in the matrices from year to year but also from city to city, since the only variable that changes is % poll. The majority of the variables show significant simple correlations at the ·01 and the ·05 levels. Since the X variables are highly correlated it is therefore not surprising that the first three principal components account for most of the variation in the X variables.

5. Principal Components

The first three components account for 86-93% of the variability contained in the X data: hence the aim of reducing the dimensionality of the problem has been achieved.

Component I is given in Table I for all cities in 1968 only, as it is consistent from year to year. It is also remarkably consistent from city to city. Clearly it is possible to use the same coefficients for all cities. This component accounts for about 60-70% of the variability of the "X" data, and may be interpreted partly as an index associated with social class, because of the signs of the coefficients of the S.E.G. variables, and the fact that owner occupation, council renting and propensity to vote are correlated with social class (see Moser and Scott (1961), Butler and Stokes (1969) and our correlation matrices in Appendix A). The only variable with little weight in the first component is "% aged 30-44 years" which is not correlated with the S.E.G. variables.

To summarise the component structure, the first four components of the pooled data for all the cities in 1968 are given in Appendix B. The first component of the pooled data is similar to those in Table I, except for the lower weights on the "% age 65+" and "% Male" variables, which now occur almost exclusively in the second component. Details of higher components for individual cities have been omitted, except for those which contribute appreciably to the regressions (Section 6).

TABLE 1

Principal Component I

X Variable	*Aberdeen* 1968	*Dundee* 1968	*Edinburgh* 1968	*Glasgow* 1968
% Poll	–0.20	–0.15	–0.19	–0.22
% S.E.G. 3	–0.29	–0.29	–0.29	–0.30
% S.E.G. 1	–0.28	–0.30	–0.31	–0.32
% S.E.G. 8	0.25	0.30	0.28	0.27
% S.E.G. 5	–0.27	–0.30	–0.31	–0.31
% S.E.G. 7	0.26	0.30	0.30	0.29
% S.E.G. 11	0.24	0.26	0.26	0.27
% Owner-occupiers	–0.32	–0.31	–0.29	–0.30
% Council tenants	0.23	0.27	0.20	0.12
% in Manufacturing	0.30	0.30	0.31	0.26
% in Transport	0.23	0.12	0.19	0.16
% in Service	–0.31	–0.31	–0.31	–0.32
% Age 30-44	0.08	0.09	0.04	0.09
% Age 65+	–0.25	–0.22	–0.20	–0.24
% Male	0.28	0.21	0.24	0.27
Eigenvalue	9.63	9.86	8.91	8.50
% of Variability	64	66	59	57

Regression Coefficients on Component One

TABLE 2

City	Year	N	% S.N.P. (Ys) a	b	% ss	% RIGHT (Yr) a	b	% ss	% LEFT (*Yl*) a	b	% ss
Aberdeen	1967	7	13·0	N.S.	N.S.	50·6	−6·6	96**	36·4	6·3	97**
	1968	12	31·3	2·5	44**	36·4	−7·3	89*	32·3	4·9	91**
	1969	12	23·6	1·7	43*	35·3	−8·5	88**	41·2	6·8	92**
Dundee	1967	12	(12·8) 11·4	1·6	42**	46·3	−6·5	96**	40·5	5·4	92**
	1968	12	(31·7) 26·0	3·5	43*	34·2	−7·2	79**	34·2	4·9	89**
	1969	12	22·2	N.S.	N.S.	38·6	−7·0	80**	39·2	6·2	90**
Edinburgh	1967	8	26·9	2·9	73**	45·6	−9·3	89**	27·5	6·5	85**
	1968	22	37·1	1·6	55**	41·1	−6·6	88**	22·3	4·8	83**
	1969	23	28·6	2·0	44**	49·0	−8·3	83**	22·4	6·2	83**
Glasgow	1967	37	22·9	N.S.	N.S.	42·1	−5·1	65**	35·8	4·6	63**
	1968	37	35·9	1·0	16**	35·2	−5·1	71**	29·0	4·1	67**
	1969	37	26·2	1·2	23**	40·2	−5·7	67**	33·3	4·5	63**

Note N is the number of wards; a, b, are respectively the intercept (mean level) and slope of the regression on component 1; and % ss is the percentage reduction in the residual sum of squares due to component 1; *, ** denote significance at ·05 level and at least ·01 level respectively, with reference to F tests on the reduction in sum of squares.

TABLE 3
Additional Regression Results for % S.N.P. Vote

			Linear				*Quadratic*			*Total*
City	*Year*	*N*	*Component*	λ	*b*	*%ss*	*Component*	*b*	*%ss*	*%ss*
Aberdeen	1968	12	4	0·9	5·32	25*	$(1)^2$	–	11 N.S.	73
	1969	12	3	1·2	3·58	24*	$(1)^2$	–	7 N.S.	67
Dundee	1967	12	2	2·8	1·3	12 N.S.—	$(1)^2$	–	5 N.S.	72
			4	0·5	3·3	14 N.S.—				
	1968	12	4	0·5	–	14*	$(1)^2$	0·63	35*	78
	1969	12	3	0·9	–	13 N.S.	$(1)^2$	–	13 N.S.	35
Edinburgh	1967	8	4	0·6	–	11 N.S.	$(1)^2$	–	5 N.S.	87
Glasgow	1968	37	6	0·4	−4·9	18**	–	–	–	34

Note: λ is the eigenvalue of the component; *b* is the corresponding regression coefficient (since the quadratic contribution is not independent of the others, only the important *b*'s are given); Total %ss is in the reduction in residual sum of squares due to component one plus all terms given in Table 3.

6. Regression Results

Taking % S.N.P. vote as the dependent variable, multiple regressions were carried out on the principal components and the squares of certain components. This procedure was repeated for % left and % right voting; the results are summarised in tables 2 and 3.

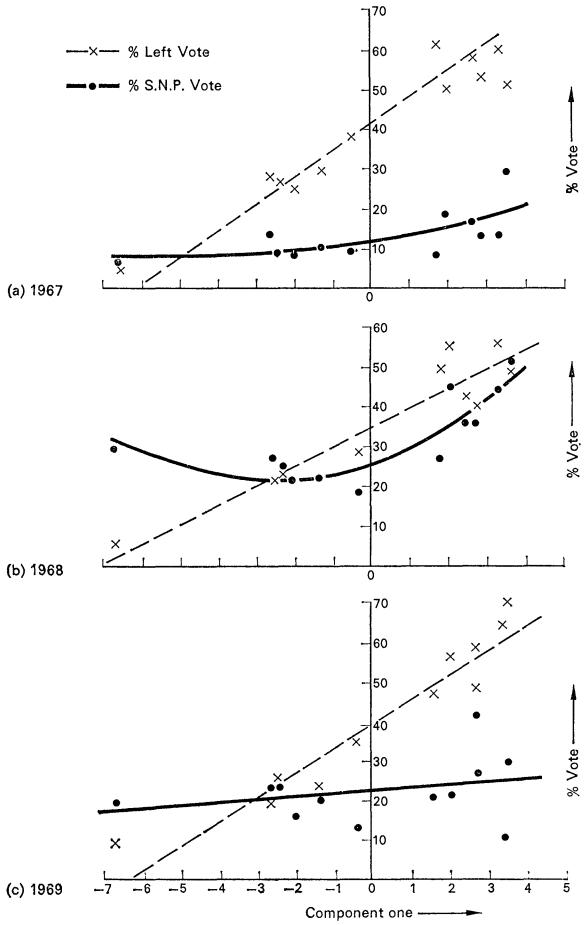
The first component was the only one which contributed consistently to the regressions. Table 2 shows that, for left voting, the linear regression on component I accounts for 83-97% of the total sum of squares, except for Glasgow where the percentages dropped to 63-67. Therefore the first component is a remarkably good estimator of left voting for Aberdeen, Dundee and Edinburgh; the higher the component score the greater the left vote. The estimates of the standard deviation of the residuals for these regressions are as low as 4-6% vote, which compares in precision with that of opinions polls, and our results would be improved by including other small but significant contributions some of which may be spurious.

Similar results are shown for right voting, except that the regression coefficients are negative.

We were not, however, so successful with Nationalist voting; linear regression accounting for only about 40% of the total sum of squares for Aberdeen and Dundee and much less for Glasgow. However, most regression coefficients were significantly positive. Other contributions to the S.N.P. regression are given in table 3 which shows that no other component is consistently associated with S.N.P., and, in the case of Dundee 1968, where a quadratic regression on component 1 was indicated (see Figure 1), the significant contribution of 14% due to component 4 is taken up almost completely by the 35% due to the quadratic term, since the squares of the scores on component 1 are not orthogonal to the scores on component 4.

In contrast, Aberdeen has components 4 and 3 contributing over 20% in 1968 and 1969 respectively. These components have weights on the white collar, semi-skilled and transport workers in common, but otherwise they are not easy to interpret. We therefore give below, without further comment, all their coefficients exceeding 0.10:

	Aberdeen 1968 Component 4	Aberdeen 1969 Component 3
% Poll	0.65	–0.19
% S.E.G. 3	–0.02	0.16
% S.E.G. 1	–0.10	0.15
% S.E.G. 8	0.02	–0.45
% S.E.G. 5	–0.29	–0.39
% S.E.G. 7	–0.32	0.47
% Council Tenants	0.17	–0.16



% Manufacturing	0.02	–0.27
% Transport	–0.56	–0.25
% Male	–0.05	0.37
Eigenvalue	0.9	1.2

The regression results are a convenient way of summarising the data; the average level of S.N.P., left and right votes may be read from the columns labelled "a" in Table 2 for each city and year. For the linear regressions the intercept is the same as the mean and for the others the mean is given in brackets.

7. Changes in Voting

The changes in voting behaviour from 1967-8 and 1968-9 were marked and are summarised in Table 4. S.N.P. support increased strongly from 1967-8 and decreased from 1968-9 in all cities. As S.N.P. support increased, two effects are apparent, firstly, there was an upwards shift in support over the whole component scale of 10 to 18 % votes on the average, and secondly, disproportionately more support was drawn from wards where the component score, and hence the labour vote, was high. Therefore, the regressions for S.N.P. have positive slopes like those for left voting. Several authors, e.g. Cornford and Brand in Wolfe (1969) suggest that S.N.P. draws its support from the left and at first sight our results appear to support this view. However, we think that the strength of S.N.P. support in solid labour wards was partly due to a swing of Conservative voters where their own party stands no chance. This combined with some swing of Labour voters accounts for the seemingly left characteristics of S.N.P. support between 1967 and 1968. This could also account for the quadratic regression in Dundee 1968 when a similar effect could have taken place at the other end of the component scale.

Table 4 clearly shows that between 1967 and 1968 the Conservatives in Aberdeen and Dundee suffered the greatest decline in average percentage share of the vote (Aberdeen –14.2, Dundee –12.1), while the decline in Labour vote was much smaller.Tabulation of actual voting figures in solid Labour wards (share of vote 60 %) indicates that it is the Conservatives in these wards who suffered the greatest decline.

Might one assume that the attraction of S.N.P. in solid Labour wards is simply that of 'not wasting one's vote,' combined perhaps with the possibility of getting non-Labour candidates elected? The motives of voters in solid Conservative wards who voted S.N.P. are harder to assess. They were not drawn from labour since the Labour vote in these wards held steady. In Dundee and Aberdeen therefore, between 1967 and 1968 major support for S.N.P. seems to come from the Conservatives, and Labour support is only a secondary effect. But in Edinburgh and Glasgow S.N.P. support appears to be drawn from both major parties.

8. Summary and Conclusions

This paper presents a successful use of Principal Component Analysis in respect of its capacity to summarise the information and to facilitate the estimation of % voting. A component analysis was made to study elements in the social structures of 84 municipal wards of four major Scottish cities. This was followed by regression analysis to relate right, left and S.N.P. voting in the 1967-9 municipal elections to the components.

TABLE 4
Changes in Regression Coefficients

City	*Period*	*S.N.P.* change in:		*RIGHT* change in:		*LEFT* change in:	
		a	*b*	*a*	*b*		*b*
Aberdeen	1967–68	+18.3**	+2.2	−14.2**	−0.8	−4.1	−1.5
	1968–69	−7.7*	−0.7	−1.2	−1.2	+8.9*	+1.9
Dundee	1967–68	+14.6**	+1.9	−12.1*	−0.6	−5.9*	−0.4
	1968–69	−3.8	−1.4	+4.4	+0.2	+5.0	+1.3
Edinburgh	1967–68	+10.2**	−1.3	−4.5	+2.8	−5.2	−1.6
	1968–69	−8.4**	+0.5	+7.9*	−1.7*	+0·1	+1.4
Glasgow	1967–68	+13.0**	+0.3	−6.9*	−0.0	−6.8*	−0.6
	1968–69	−9.7**	+0.2	+5.3	−0.6	+4.3	+0.4

Note: *, ** denote significance at ·05 level and ·01 level, respectively, with reference to *t* tests on the differences.

Fifteen original variables were reduced to three or four orthogonal components; fourteen of the variables were from census data, the other being percentage poll. Component 1 was the most important, accounting for 80-97% of the total sum of squares for left and right voting in Aberdeen, Dundee and Edinburgh but not in Glasgow where the figure is 63-71%. Also it accounts for much less in S.N.P. voting in all cities. Component 1 for each city is the only consistent contributor to the reduction in the residual sum of squares and it could be a useful tool of comparative urban sociology because it (a) is highly consistent from city to city, (b) comprises social class, old age and sex and, in our case, (c) is a good estimator of left and right voting.

Voting for S.N.P. does not conform to traditional party divisions. In 1968 it seemed to conform to traditional left voting, but Labour support is apparently a secondary effect. Our evidence strongly suggests that the leftward slope of S.N.P. on component 1 was due to a heavy swing of ex-Conservative voters in Labour wards with some reinforcement from traditional Labour supporters. But in Edinburgh and Glasgow Nationalist support was drawn evenly from the two major parties over the same period. The weakness of component 1 as an estimator of S.N.P. voting in Glasgow may be due to the large Catholic population there. Evidence, see Cornford and Brand in Wolfe (1969), suggests that Catholics do not vote Nationalist and therefore religion may cut across class allegiances in terms of voting preference giving greater randomness to the distribution of wards on component 1 in respect of S.N.P. Finally, it may be suggested that the minority parties, without substantial organisation, might be able to estimate what percentage votes they would have obtained, compared to the others, if they had had a candidate in every ward and hence achieve an optimum distribution of candidates.

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Appendix A

Table 1 Correlation Matrix: Aberdeen 1968

Significance Level: 5% = .58
1% = .66

	S.N.P.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
2. Right	-.83																
3. Left	.55	-.92															
4. Poll	-.86	.74	-.50														
5. S.E.G. 3	-.48	.77	-.83	.51													
6. S.E.G. 1	-.50	.79	-.84	.50	.87												
7. S.E.G. 8	.37	-.66	.74	-.35	-.83	-.84											
8. S.E.G. 5	-.54	.82	-.78	.50	.62	.68	-.48										
9. S.E.G. 7	.51	-.72	.73	-.48	-.72	-.67	.42	-.88									
10. S.E.G. 11	.63	-.79	.76	-.56	-.66	-.82	.49	-.72	.62								
11. OCC.	-.55	.90	-.98	.50	.88	.88	-.82	.79	-.75	-.73							
12. RENT.	.25	-.63	.77	-.11	-.57	-.46	.61	-.48	.41	.30	-.77						
13. MAN.	.53	-.86	.92	-.48	-.87	-.92	.89	-.67	.57	.79	-.94	.70					
14. TRANS.	.73	-.82	.72	-.67	-.71	-.58	.62	-.43	.39	.55	-.72	.54	.71				
15. SERV.	-.61	.88	-.90	.53	.92	.79	-.74	.82	-.85	-.66	.94	-.71	-.84	-.70			
16. 30-44 YR.	.19	-.24	.22	-.03	-.01	.05	.14	-.16	.13	-.27	-.25	.54	.07	.24	-.25		
17. 65+ YRS.	-.51	.75	-.77	.40	.56	.57	-.59	.50	-.47	-.39	.76	-.86	-.70	-.60	.70	-.63	
18. MALES.	.67	-.80	.73	-.62	-.70	-.56	.38	-.73	.84	.56	-.74	.61	.58	.60	-.86	.34	-.73

Appendix A

Table 2 Correlation Matrix: Dundee 1968

	S.N.P.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
2. Right	-.89																
3. Left	.73	-.96															
4. Poll	-.45	.58	-.60														
5. S.E.G. 3	-.46	.74	-.84	.38													
6. S.E.G. 1	-.63	.87	-.92	.59	.90												
7. S.E.G. 8	.65	-.86	.90	-.39	-.92	-.94											
8. S.E.G. 5	-.58	.85	-.94	.52	.90	.90	-.88										
9. S.E.G. 7	.57	-.84	.92	-.53	-.93	-.94	.88	-.95									
10. S.E.G. 11	.33	-.64	.78	-.58	-.83	-.83	-.69	-.89	.87								
11. OCC.	-.53	.80	-.88	.38	.95	.94	-.92	.90	-.96	-.81							
12. RENT.	.61	-.74	.73	-.01	-.73	-.65	.77	-.70	.69	.48	-.80						
13. MAN.	.66	-.90	.96	-.64	-.85	-.96	.91	-.94	.90	.85	-.89	.68					
14. TRANS.	.14	-.21	.22	.26	-.23	-.19	.20	-.11	.16	.16	-.34	.55	.17				
15. SERV.	-.67	.90	-.94	.48	.86	.94	-.91	.90	-.89	-.80	.93	-.81	-.96	-.42			
16. 30-44 YR.	.40	-.24	.11	.52	-.12	-.08	.21	-.65	.10	-.14	-.26	.66	.03	.64	-.23		
17. 65+ YRS.	-.56	.60	-.56	.50	.47	.52	.46	-.43	-.54	-.26	.66	-.84	-.48	-.65	.66	-.73	
18. MALES.	.62	-.62	.54	-.11	-.40	-.50	.46	-.43	.51	.27	-.61	.79	.48	.59	-.65	.73	-.97

Significance Level: 5% = .58
1% = .66

Appendix A

Table 3 Correlation Matrix: Edinburgh 1968

Significance Level: 5% = .42
1% = .54

	S.N.P.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
2. Right	-.83																
3. Left	.23	-.94															
4. Poll	-.15	.29	-.35														
5. S.E.G. 3	-.43	.71	-.74	.48													
6. S.E.G. 1	-.64	.86	-.86	.67	.92												
7. S.E.G. 8	.47	-.74	.76	-.25	-.92	-.82											
8. S.E.G. 5	-.42	.77	-.88	.55	.69	.84	-.67										
9. S.E.G. 7	.39	-.75	.85	-.57	-.80	-.90	.72	-.91									
10. S.E.G.11	.51	-.69	.70	-.80	-.66	-.83	.44	-.81	.75								
11. OCC.	-.52	.79	-.84	.50	.57	.74	-.56	.83	-.77	-.69							
12. RENT.	.32	-.55	.59	-.06	-.27	-.37	.35	-.54	.47	.30	-.83						
13. MAN.	.36	-.72	.80	-.53	-.81	-.86	.83	-.88	.87	.65	-.70	,41					
14. TRANS.	.33	-.52	.52	-.09	-.68	-.54	.72	-.39	.44	.26	-.26	.20	.46				
15. SERV.	-.47	.77	-.80	.42	.82	.80	-.81	.82	-.80	-.63	.72	-.54	-.86	-.70			
16. 30-44 YR.	-.04	-.04	-.04	.28	.15	.22	-.02	-.04	-.12	-.19	-.12	.43	.01	.25	-.30		
17. 65+ YRS.	-.39	.53	-.51	.12	.24	.29	-.35	.57	-.41	-.28	.72	-.82	-.48	-.19	.63	-.64	
18. MALES.	.36	-.57	.54	-.28	-.55	-.50	.53	-.56	.47	.47	-.63	.58	.53	.48	-.74	.53	-.75

Appendix A

Table 4 Correlation Matrix: Glasgow 1968

	S.N.P.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
2. Right	-.60																
3. Left	.22	-.92															
4. Poll	-.23	.52	-.52														
5. S.E.G. 3	-.35	.71	-.69	.46													
6. S.E.G. 1	-.37	.81	-.80	.60	.85												
7. S.E.G. 8	.45	-.72	.65	-.24	-.71	-.79											
8. S.E.G. 5	-.31	.75	-.74	.73	.69	.85	-.59										
9. S.E.G. 7	.36	-.59	.53	-.67	-.71	-.82	.50	-.85									
10. S.E.G. 11	.15	-.66	.73	-.75	-.70	-.77	.33	-.89	.73								
11. OCC.	-.52	.83	-.75	.48	.71	.77	-.67	.73	-.70	-.61							
12. RENT.	.34	-.42	.34	.14	-.25	-.18	.48	-.08	.06	-.12	-.58						
13. MAN.	.13	-.69	.77	-.31	-.70	-.76	.69	-.69	.52	.63	-.62	.30					
14. TRANS.	.18	-.27	.24	-.39	-.40	-.42	.23	-.45	.55	.35	-.38	-.03	-.06				
15. SERV.	-.21	.74	-.79	.48	.83	.87	-.77	.81	-.72	-.70	.75	-.35	-.89	-.36			
16. 30-44 YR.	.05	-.24	.27	.06	-.10	-.10	.37	-.09	-.04	-.11	-.30	.64	.16	.02	-.21		
17. 65+ YRS.	-.40	.69	-.64	.36	.49	.60	-.65	.60	-.49	-.40	.67	-.49	-.57	-.09	.59	-.51	
18. MALES.	.45	-.57	.47	-.55	-.66	-.64	.55	-.60	.64	.49	-.73	.42	.34	.45	-.55	.41	-.62

Significance Level: 5% = .31
1% = .40

Appendix B

Principal Components: All Cities 1968

Variable	Component 1	Component 2	Component 3	Component
% Poll	-0.19	-0.01	-0.55	-0.17
% S.E.G. 3	-0.33	0.03	0.01	0.17
% S.E.G. 1	-0.34	0.01	-0.06	-0.01
% S.E.G. 8	0.31	0.01	-0.20	-0.27
% S.E.G. 5	-0.32	-0.14	-0.13	-0.21
% S.E.G. 7	0.30	0.18	0.07	0.12
% S.E.G. 11	0.28	-0.04	0.33	0.29
% Owner-occupiers	-0.31	-0.07	0.19	-0.03
% Council Tenants	0.16	0.26	-0.50	-0.17
% in Manufacturing	0.31	-0.09	-0.24	0.22
% in Transport	0.15	-0.06	0.36	-0.78
% in Service	-0.34	0.01	0.08	0.07
% Age 30-44	-0.06	0.47	0.21	-0.18
% Age 65+	0.01	-0.60	0.01	-0.03
% Male	-0.12	0.53	0.06	-0.06
Eigenvalue	7.7	2.5	1.5	0.96
Cumulative % of Total	51	68	78	85