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PATTERNS OF PARTY COMPETITION IN BRITISH GENERAL AND FINNISH MUNICIPAL ELECTIONS

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Дана классификация результатов парламентских выборов 1992, 1997 и 1999 гг. в округах Великобритании в терминах относительной поддержки основных партий. Исследована устойчивость результатов голосований в избирательных округах. Решена та же задача для семи последних (1976—2000 гг.) муниципальных выборов в Финляндии. Оказалось, что распределение средней поддержки партий может быть описано несколькими похожими типами. Аналогично, реализуется только несколько временных трендов при анализе устойчивости электоральной поддержки партий.

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First we provide a classification of the electoral outcomes in the 1992, 1997 and 2001 parliamentary elections in the constituencies of Great Britain in terms of the relative support of the main parties. Then we analyze the over-time stability of the competitive settings in various constituencies. Next we solve the same problem for seven most recent Finnish municipal elections. It turns out that only very few classes are needed to characterize the average patterns of support distribution. Our main finding is that out of thousands of conceivable over-time trends only few are needed to characterize the support development in both countries.

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1. Introduction

Party competition belongs to the traditional foci of political research. Like in any competition, the successful strategies of parties depend on the strategies of the competitors and on the rules of the game. In party competition the latter consists primarily of the electoral system. What works in a system of single-member constituencies, may not work in multi-member ones. In fact, two well-known principles of electoral behavior, viz. Duverger's Law and Duverger's Hypothesis, state that certain types of electoral systems give rise to specific types of party systems (see Duverger, 1954; Riker, 1976; Riker, 1982). The validity assessment of these two principles is a proper subject of comparative research. Yet, there may be interesting principles also within a given electoral system. Our focus is on such principles. More specifically, we shall study the patterns of electoral competition prevailing in a given system over time, i.e. over a period of several elections.

Our interest differs from the mainstream party competition literature in focusing on electoral outcomes rather than on party strategies. Predictive theories of competition attempt to predict which kind of strategies the parties resort to in their contest for seats in the parliament. The best-known example of such a theory is Downs's (1957) spatial theory of competition (see also Riker and Ordeshook, 1973; Robertson, 1976). Once the voter opinions and party strategies are given, the electoral outcomes can be predicted under specific assumptions regarding voting behavior. These outcomes then form the basis for the next round of competition.

Our interest is in the outcomes as such. Our aim is provide a meaningful classification of them. In other words, we introduce a method for grouping election outcomes into classes according to the nature of competition prevailing in various constituencies.

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Once we have determined the clusters ("system states") of nearly identical electoral support our next task is to look at the "movements" from one cluster to another that have occurred in districts over the span of several recent elections. We thus present a method of finding out the natural states and state transitions viewed from the angle of electoral support.

Our discussion proceeds as follows. The next section 2 outlines our methodology, *i.e*. the algorithm used in generating the types of districts with roughly similar electoral support distribution.

We then present in sections 3-6 the distribution of constituencies in Great Britain (separately for England, Scotland and Wales) general elections of 1992, 1995 and 1999 over various types including the dynamics, *i.e*. the over-time movements of constituencies from one type to another as well as the most common time-paths in the observed three elections.

Although national elections are generally viewed as most significant, local elections are also important in political systems where the political authority is decentralized to geographically defined units. The degree of decentralization varies a great deal from country to country, but in general the lower level administrative units enjoy some degree of autonomy in certain areas of political decision making. This is, of course, most apparent in federal states, but also in formally non-federal systems, the lower level units, provinces, municipalities etc. usually exercise considerable power in various areas of public policy. It is therefore natural that political parties devote considerable attention also to the local level elections. This is definitely the case in Finland where the municipalities have considerable autonomy in many important areas of public policy: public health care, education, social welfare, public safety *etc*.

Municipalities being the only lower level entities in Finland with popularly elected decision making bodies, the elections of those bodies attract a lot of media attention and are often viewed as indicators of support trends in national level as well [1]. To an increasing extent the campaigns of local elections are being organized by national party head quarters and conducted in a nationally coordinated fashion emphasizing country-wide election issues.

In section 7 we give a short exposition of Finnish party system and the in sections 8 and 9 we proceed with the same type of analysis in a sequence of seven most recent municipal elections. What we are interested in is whether it is possible to classify the Finnish municipalities into classes with similar support distribution patterns. It is of course trivial to argue that no two municipalities are identical, but then again it is obvious that small changes in support do not necessarily mean essential changes in the competition setting. What we

[1] Features of the Finnish electoral system (parliamentary and presidential) are discussed *e.g.* in Nurmi and Lagerspetz (1984) and Nurmi (1990).

suggest is that there is a way of finding out clusters of similar municipalities so that the distinctive features of the party competition are nearly identical within each cluster.

Section 10 contains concluding remarks.

2. Patterning of electoral outcomes

Which constituencies resemble each other in terms of electoral competition? If vote distributions over the major party candidates are taken as the primary indicator, then obviously no two constituencies are identical. Yet, intuitively some are pretty close to each other, while others are far apart. The first task of systematic study is to provide a classification of constituencies so that within each class the constituencies are "close" to one another and reasonably dissimilar to those in other classes.

The empirical data concerning elections contain information about results of elections and vary significantly among the districts as well as between election years. Knowing the typology of voting behavior might shed light on important common features of districts. This problem becomes even more important when we study electoral outcomes from a dynamic perspective.

One important instrument to find a similarity among the objects represented through the set of parameters is the clustering approach. This approach is based on some definition of a measure of closeness of objects in the space of parameters. Using this measure, the clusters of objects are defined in such a way as to have similar objects in each cluster, while at the same time securing that different clusters contain different objects (distant in terms of some measure). However, very often the numbers, which characterize these objects, are not important by themselves. More important is the information about relations between the parameters. For instance, consider the following three districts with the electoral outcomes as given in Table 1.

It is obvious that in Districts 1 and 2 the voters vote mostly for parties 1 and 3, while in District 3 they support mostly Party 2. These results separate the districts into two groups of similar objects; in the first one we have Districts 1 and

Table 1: *Hyperthetical Election Results in Election*

	Party 1	Party 2	Party 3
District 1	40	20	40
District 2	45	10	45
District 3	20	60	20

2, that are similar in terms of electoral outcomes and in the second group we have District 3 that is different from the rest of the districts

To find such similarities in electoral outcomes over districts we use a clustering analysis approach, which uses relative values of parameters rather than their absolute values. In fact, to find clusters, we use an algorithm of clustering curves. Briefly, the idea of the algorithm is as follows: in the x-axis we put the identification numbers of parties (1, 2, ... , n) and on the y-axis the percentage of votes which the corresponding parties receive in elections. We then construct a "curve" (piece-wise linear) which passes through the corresponding points. Thus, for m districts, we obtain m curves and the next exercise is to find those that are similar. For the example given in Table 1, our picture will look as shown in Figure 1.

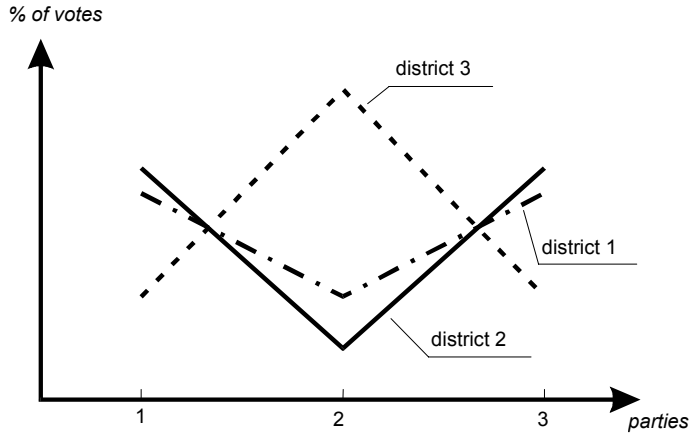

Figure 1: *Hypotethical Election Results in Election T*

This very approach has been successfully used in (Aleskerov and Alper, 2000). The formal procedure for finding the groups of similar curves is given in the Appendix.

Assume now that for each election year such clusters are obtained. Each cluster contains curves which define a special type of electoral outcome, e.g. more votes for right-wing parties, less votes for leftist and nationalist parties, or the average level of votes for rightist and leftist parties, and low level of votes for nationalist parties. If we apply clustering algorithm for several election years, we thus obtain clusters for each year, and it is possible that the typology defined by some cluster is repeated over years although the cluster may contain different districts. For the example given in Table 1, say for year T, we have two clusters. Assume now that in year $T+1$ we obtain the following outcomes (Table 2).

Table 2: *Hyperthetical Election Results in Election T + 1*

	Party 1	Party 2	Party 3
District 1	35	30	35
District 2	38	24	38
District 3	40	20	40

Then Districts 2 and 3 will be grouped together and District 1 separately. Note that now District 2 and 3 show electoral outcomes similar to those obtained for election at T in Districts 1 and 2. District 1 now shows an outcome that is different from all others obtained in years T and $T+1$. It is natural now to consider that we have three different types of election results, which will be called patterns below.

Pattern 1:	Districts 1 and 2 in year T Districts 2 and 3 in year $T+1$
Pattern 2:	Districts 3 in year T
Pattern 3:	Districts 1 in year $T+1$

After deriving such patterns, it is interesting to analyze which pattern a district belongs to at the initial election year, and how the district changes its pattern over the subsequent elections. For instance, in the example above one can obtain the following situation where the x-axis denotes time (election years) and y-axis represents patterns (see Figure 2). One observes that District 1 changes the pattern from 1 to 3, District 2 keeps pattern 1, and District 3 changes its pattern from 2 to 1. It is of interest to understand which districts preserve their patterns over the years, which districts change them and why.

The problem in such analyzes is that the number of clusters can be very large, and, accordingly, the number of patterns, which describe the electoral outcomes over years, might be very large as well. Indeed, if there are 5 election years and for each election year we obtain, say, 10 clusters, then the maximum possible number of patterns is 50. The maximum possible number of paths, which shows the changes in districts' electoral behavior, is then $50^5 = 312\,500\,000$. However, it turns out that in the analysis of real elections these numbers are not achieved, and the real number of patterns and paths remains reasonably small. Using this method, we will analyze the electoral outcomes across Great Britain districts for three consecutive elections between 1992 and 2001, and Finnish municipal elections for seven consecutive elections between 1976 and 2000.

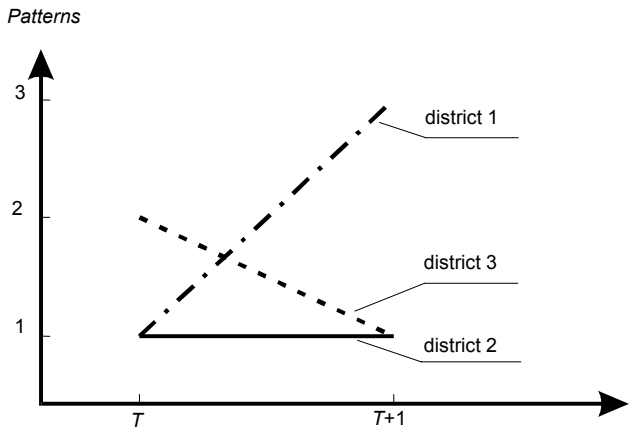

Figure 2: *Hypothetical Election Results in Election T+1*

3. Clusters of party competition in England

Using the algorithm mentioned above we first analyzed the 1992 election data in England and came up with 8 distinct patterns of distribution of support for the three main national parties and other parties which together to form the group "others" (patterns 1—6,8,9 in Table 3). We then looked at the 1997 elections and found 3 new patterns (7,10,12). The 2001 elections produced 2 more patterns (11,13). Table 3 lists these 13 patterns indicating the average support — within each cluster — in percentage for Conservatives, Labour, Liberal Democrats and others.

Some general features of the patterns are worth pointing out. Firstly, Patterns 10-13 exhibit relatively strong support for "others", with 12 and 13 characterizing constituencies where the three main national parties together receive less than 50% of votes. Patterns 1 and 4 are constituencies where Labour and Conservatives, respectively, get more than half of the votes. Patterns 2 and 4 both exhibit strong support of the Conservatives with the second largest vote-getter enjoying support which is roughly midway between the Conservative vote share and that of the third party.

Similarly, in Labour dominated patterns, 1 and 3 differ in terms of the vote share of runner-up Conservatives. In another Labour dominated pattern, 10, the two other main parties are far behind the winner with "others" coming second.

Table 3: *Patterns of party support in England*

Pattern no.	Cons.	Lab.	Lib.Dem.	other
1	23,18	60,23	12,49	4,1
2	48,82	32,88	15,76	2,53
3	38,08	47,61	11,8	2,52
4	50,97	19,05	26,78	3,19
5	41,42	12,98	42,42	3,17
6	14,22	46,29	36,40	3,07
7	31,40	38,75	24,77	5,08
8	35,24	28,08	33,74	3,0
9	12,72	36,25	48,50	2,50
10	0	65,30	0	34,70
11	38,0	12,60	15,60	33,80
12	37,5	0	0	62,5
13	19,1	22,1	0	58,8

The two Lib Dem dominated patterns, 5 and 9, differ in the order of support for the Conservatives and Labour.

These 13 being the patterns of support distribution in constituencies, one is led to ask what is the distribution of constituencies over these patterns, i.e. how many constituencies belong to each of these patterns in the three elections in England. Table 4 reports this.

Table 4: *Distribution of constituencies over patterns of party support*

Pattern	1992	1997	2001
1	75	240	214
2	170	77	87
3	118	78	107
4	112	66	55
5	44	48	54
6	5	5	4
7	0	8	4
8	3	5	0
9	2	0	2
10	0	1	0
11	0	0	1
12	0	1	0
13	0	0	1

It turns out that the first six patterns account for more than 90% of the constituencies in all three elections. In the 1992 election, pattern 2 was the most common, while in 1997 and 2001 elections pattern 1 was observed more often than any other pattern. Thus, constituencies with strong Labour dominance are most common in the two most recent elections.

Of some interest are patterns which occur only once in three elections. These are 10—13. Last three of them exhibit strong support for "others". In the light of the three elections these are unstable patterns, i.e. occur only once.

4. Dynamics of party support in the constituencies in England

The clustering algorithm provides us with a classification of constituencies. A look at the frequencies of patterns in each three elections gives some clue as to what kinds of changes in support have occurred over time. However, what one can find out in those distributions is the net effect of support changes. In other words, the distributions are consistent with a wide variety of constituency-wise support changes. A more accurate picture of the latter changes is obtained by observing the time-paths of constituencies over patterns in the three elections. Table 5 lists the most common time-paths along with their frequencies. Time-paths are expressed as number sequences *x-y-z* where *x* denotes the pattern observed in the 1992, *y* in the 1997 and *z* in the 2001 elections.

The 440 constituencies listed in Table 5 constitute 83% of all constituencies in England. Of these 440, nearly a half (197) are "stable" ones in the sense that the pattern of support has remained in the same cluster throughout the period of the three elections. In other words, in about 37% of the English constituencies the pattern of party competition has remained unchanged. Almost the same number of constituencies have experienced a change from one pattern to another followed by no change. The most common time-path 3-1-1 is of this nature.

Table 5: *Distribution of time-paths over constituencies in three elections*

Time-path	Frequency
1-1-1	74
2-2-2	46
4-4-4	42
5-5-5	35
3-1-1	107
2-3-3	65
4-2-2	25
2-1-1	24
2-1-3	22

Thus, only 9 distinct time-paths are needed to characterize the bulk of the over-time variation in electoral outcomes. The most common stable time-path 1-1-1 indicates strong Labour dominance with Conservatives next and Liberal Democrats some 10% units behind the latter. Roughly 14% of English constituencies are of this type.

The second most common stable path, 2-2-2, represents Conservative domination, but with Labor following with some 10% units less support. The third most common path 4-4-4 is characterized by about 50% support for Conservatives followed by Labour and Liberal Democrats with roughly equal support. Finally, the 5-5-5 stable path shows almost equal support for Conservatives and Liberal Democrats.

The Labour victory in 1997 is clearly visible in the one-change paths 2-1-1 and 2-3-3 where the Conservative dominance first changes into Labour one and remains that way in the third election.

The preceding table gives the distribution of constituencies over patterns of support in the three elections under study. Perhaps of more interest is the distribution of constituencies over types of dynamic patterns. The types are the following: *x-x-x*, *x-x-y*, *y-x-x*, *x-y-x*, and *x-y-z* where *x*, *y* and *z* denote distinct patterns. Thus, the first type denotes a stable dynamic pattern, e.g. 1-1-1 and so on. The following Table 6 gives the distribution of constituencies over types.

Table 6: *Distribution of English constituencies over dynamic types*

Dynamic type	Frequency	% of constituencies
x-x-x	199	37.62
x-x-y	21	3.97
y-x-x	251	47.45
x-y-x	20	3.78
x-y-z	38	7.18

5. Continuity and change in Scotland

Not surprisingly, the Scottish elections present somewhat different picture. The presence of a strong "fourth" party allows for a wider variation of patterns of electoral support. It turns out, however, that 18 patterns are sufficient to cover all three elections in the constituencies of Scotland. The average support of the parties in these clusters is indicated in Table 7. Of these patterns 9 were present in more than one election. In lieu of the distribution of constituencies over patterns we state only some highlights. Firstly, pattern 1 is vastly more common than any other pattern in each election. Indeed, it accounts to more than 50% of the constituencies in all three elections. As shown in Table 7 this pattern is characterized by a strong Labour support with Scottish Nationalist party coming next, but trailing far behind Labour.

The next most common patterns are 2 and 3, but their share is less than 10% in three elections. Together with pattern 1 these are the only ones that appear in every election. Others are much less common in any election and completely absent in some of them.

The over time change from one pattern to another is indicated in Table 8. We observe that by far the most common dynamic type is one with no change in sup-

Table 7: *Patterns of party support in Scotland*

Patterns	Cons.	Lab.	Lib.	SNP	Other
1	13,1	53,62	8,97	21,5	2,81
2	31,87	43,62	9,56	13,82	1,12
3	26,76	13,57	43,92	14,39	1,38
4	38,1	12,7	8,85	39,76	0,6
5	16,17	25,24	38,08	17,44	3,06
6	27,05	14,83	7,98	48,1	2,0
7	21,08	36,18	28,53	12,1	2,1
8	26,75	24,7	12,7	32,93	2,95
9	43,3	28,3	13,6	14,33	0,47
10	18,05	34,5	20,65	25,75	1,05
11	10,55	17,6	53,05	13,4	5,4
12	37,8	20,65	28,3	12,3	1,0
13	46,55	6,55	30,95	15,55	0,45
14	23,5	23,2	26,7	25,1	1,6

port pattern over the three elections. What is not shown in the table is that the type 1-1-1 is much more prevalent than any other: 40 out of 72 constituencies belong to this type. We notice that the stable *x-x-x* type is clearly more common in Scotland than in England. Yet, the most volatile constituencies, i.e. those of type *x-y-x*, are relatively more common in Scotland than in England.

Table 8: *Distribution of Scottish constituencies over dynamic types*

Dynamic type	Frequency	% of constituencies
x-x-x	44	61,1
x-x-y	1	1,4
y-x-x	17	23,6
x-y-x	2	2,4
x-y-z	8	11,1

6. Continuity and change in Wales

In Wales one would expect somewhat similar patterns and dynamic types as in Scotland since the role played by Plaid Cymru resembles that by Scottish Nationalists with respect to the three main British parties. Table 9 indicates the patterns of party support in the three elections in Welsh constituencies.

By far the most common pattern is 1 which was observed in 13 constituencies in 1992, 24 constituencies in 1997 and 11 constituencies in 2001 elections. The second most common is 2 which was observed in 50% of the constituencies in 2001. All other patterns were either absent or occurred at most once in one or more elections.

Table 9: *Patterns of party support in Wales*

Patterns	Cons.	Lab.	Lib.	PC	Other
1	13,98	65,61	9,56	8,65	2,6
2	32,3	47,91	12,13	6,05	1,61
3	16,27	38,44	7,24	36,21	1,81
4	30,1	18,28	44,28	4,32	2,96
5	15,73	24,7	6,97	50,7	1,9
6	20,07	39,1	30,93	5,07	4,8
7	21,7	17,0	26,7	34,65	0
8	34,9	26,05	33,6	4,15	1,35
9	22,85	17,15	7,35	51,5	1,15
10	34,6	23,5	4,4	37,1	0,4
11	14,9	24,3	16,5	41,6	2,7

Table 10: *Distribution of Welsh constituencies over dynamic types*

Dynamic type	Frequency	% of constituencies
x-x-x	19	47,5
x-x-y	2	5
y-x-x	4	10
x-y-x	13	32,5
x-y-z	2	5

The dynamics of the Welsh constituencies in the three elections is presented in Table 10. Also Wales exhibits larger share of stable patterns than England. In this regard, however, Scotland is in its own class. On the other hand, the volatility as measured by the share of *x-y-z* type is lowest in Wales.

7. The System of Municipal Elections in Finland

The municipal elections in Finland are held at four-year intervals. In contradistinction to many other countries the Finns elect only municipal councils which then in their turn elect either directly or indirectly the committees and political office-holders in each municipality. The sizes of the councils vary proportionally with the size of the population from 17 to 85. The former figure applies in municipalities with less than 2000 inhabitants and the latter in those with population in excess of 400.000[2].

[2] In the smallest municipalities the council can decide that the number of council members is less than 17. In any case it may not be smaller than 13 (Tarasti and Taponen 1996, 150).

The number of municipalities has varied from more than 600 to about 450. The number of council members in the country is somewhat less than 13.000. It has remained relatively constant for quarter of a century. The electoral law reform of 1925 made it possible to set up municipal councils by implicit consensus, *i.e.* by formal declaration of the electoral authority that the number of candidates proposed is no larger than the number of council seats to be filled[3]. Although the number of council members has remained largely the same over five decades, the number of those seeking council membership has fluctuated from the current low of less than 40.000 to the high of almost 67.000 reached in 1980[4]. In terms of the *a priori* likelihood of getting elected, the Finnish municipal elections have thus not become more competitive. Rather the trend is towards less competition if the (No. of candidates/no. of seats) is deemed an appropriate average measure of degree of competition.

Each municipality is considered as a separate electoral district. In other words, the region- or nation-wide support distributions play no role in the computation of election results in a municipality. The formula used in determining the council seat distribution, once the support distribution is known, is that of d'Hondt. Electoral alliances are permitted.

8. Types of support distribution in municipal elections in Finland

The empirical data of our study consists of seven most recent municipal elections in Finland, those held in 1976, 1980, 1984, 1988, 1992, 1996 and 2000. We have focused on the support share of 6 major parties, the Social Democratic Party (SDP), the Center Party (KESK), the National Coalition Party (KOK), the Left Alliance (VAS), the Swedish People's Party (RKP) and the Green League (VIHR).

The units of observation are election results in each municipality at each election. Using the algorithm described above we try to find out whether there exists a natural way of classifying the observations into classes of similar types of political environment. The latter is thought to consist of the support distribution among the above 6 major parties. As the number of municipalities has been 452 throughout the observation period, the maximum number of clusters one could expect is more than 3000. The minimum number, on the other hand, is 1. The former case would mean that each municipality would constitute a separate cluster and, moreover, each election would create a new cluster in each constituency. The observation units would be maximally dissimilar. The polar opposite would be the latter case of single cluster. This would mean that the municipalities would not differ essentially from each other either across time or space.

[3] This possibility has, however, not been resorted to after 1980 when the required consensus was reached in one small island municipality, Velkua.

[4] See Statistics Finland web site: http://www.stat.fi/tk/he/vaalit.

Table 11: *The Distribution of Patterns of Support*

Pattern	No. of observations	Pattern	No. of observations
1	386	24	45
2	190	25	37
3	190	26	34
4	189	27	33
5	180	28	33
6	134	29	33
7	127	30	27
8	119	31	19
9	101	32	19
10	96	33	17
11	95	34	17
12	80	35	15
13	78	36	14
14	75	37	13
15	71	38	13
16	58	39	12
17	57	40	11
18	57	41	10
19	55	42	10
20	50	43	10
21	48	44	10
22	47	45	10
23	47	46	9

The optimal clustering results in 87 clusters or types of support distribution. In other words, we need no more than 87 types to classify all municipal election outcomes in 7 elections. In fact, a vast majority of observations can be captured in far fewer types. Table 11 lists the distribution of observations over 46 most common support patterns. The rest of the patterns occurred in less than 10 cases. In fact, 21 support patterns occurred in less than 5 cases each.

We may thus conclude that the support patterns had a highly uneven distribution with first 9 occurring in more than 100 case each, while the six least frequent patterns each occurred in one case only. What then are the most common support distribution patterns? In other words, what kind of competition situation prevailed most commonly in the seven most recent municipal elections in Finland? To answer this question we need a succinct way of describing each cluster of support distribution. We have chosen the arithmetic mean of the support of parties within each cluster. Table 12 gives the description of the most common support distribution patterns in terms of the average support.

By far the most common pattern of distribution seems to be one where KESK has the absolute majority of votes followed by VAS with SDP and KOK trailing far behind. This is a typical countryside municipality distribution especially prevalent in northern and eastern parts of the country. The very strong position of KESK in Finnish municipalities becomes even more evident by the observation that also the second most common pattern is characterized by KESK's dominant position with SDP second and KOK third.

Table 3: *The Average Support of Parties within Clusters*

Patterns	SDP	KESK	KOK	VAS	RKP	VIHR	Other
1	9,55	53,33	8,42	21,84	0	0,48	6,37
2	28,26	41,1	14,96	2,29	0	0,91	12,47
3	34,32	7,59	27,68	17,43	0,92	1,88	10,2
4	13,25	53,82	14,98	0,85	0	0,34	16,76
5	18,09	44,08	8,89	10,66	0	0,25	18,01
6	13,16	46,91	19,93	10,97	0	0,2	8,83
7	13,88	45,56	22,85	15,41	0	0,38	3,93
8	10,25	49,49	9,56	16,45	0	0,35	13,91
9	17,92	1,52	1,65	1,97	71,31	1,07	4,55
10	29,19	37,69	18,35	11,08	0	0,73	2,94

The third most common pattern is one where SDP has the plurality of votes followed by KOK and VAS. This is a fairly common pattern in urban municipalities,

The very strong position of KESK in the Finnish local politics is also reflected in the fact that out of the 10 most common distribution patterns 8 feature KESK as the clear plurality winner. In the other 2 patterns, one has SDP and the other RKP in the winning position. As was just mentioned, the former pattern is common in urban municipalities, while the latter characterizes many small coastal or archipelago municipalities with large share of Swedish speaking population.

Tables 11 and 12 tell us which have been the most typical patterns of support of the major parties in the last seven municipal elections. The unit of observation in these tables is the result of one of the seven elections in one municipality. Thus, one may wonder how it is possible that SDP, which has been the largest or second largest party in the country for decades, has a relatively modest showing in the most common patterns of support. The reason is that the strongholds of SDP are populous municipalities which are not many in number, but account for large shares of the country's population.

The observation period of seven elections is fairly long and, thus, one might expect changes, even big ones, to occur in municipalities over this period of time. Whether this has or has not been the case, can only partially be inferred from the above tables. Therefore, we shall now turn to this question.

9. Dynamics of party support in the municipalities in Finland

The clusters formed using the algorithm described above describe the entire observation period. It may happen that a municipality belongs to a cluster i at election 1, but due to changes in support, belongs to *j*. Indeed, one municipality may undergo many such changes over the span of seven elections. The maximum number of pattern changes is of course 6, while the minimum is 0. There are several ways of describing the over-time movements of municipalities from one pattern to another. We shall adopt the following. Let *x* denote a pattern. By path we mean a 7-tuple consisting of numbers 1, ..., 87 where the first one denotes the pattern which characterizes the municipality in the first election, *etc*. The 7-tuple *x-x-x-x-x-x-x* denotes a municipality that has remained in the same pattern *x* throughout the observation period. We shall call municipalities of this type absolutely stable for the obvious reason that no essential changes in the relative power positions of parties have occurred during the last seven elections.

Somewhat less stable are municipalities which have experienced one or two changes of patterns, *e.g.* of the type *x-x-y-x-z-x-x*, where *x, y* and *z* are distinct patterns. Let us call paths, in which at most three distinct patterns occur, semi-stable. Thus, for example, *x-x-x-y-z-y-z* is a semi-stable path. Completely unstable is obviously the path which consists of 7 different patterns, *i.e.* a completely unstable municipality has been assigned to different pattern in each of the seven elections. The paths that are not absolutely stable, completely unstable or semi-stable are called unstable. In unstable paths at least 4 but less than 7 different patterns occur. We acknowledge that there is some arbitrariness in these classifications, but they are used mainly for purposes of exposition. Table 13 summarizes the distribution of the municipalities over these path types.

One would expect that in a fairly long period of observation, at least some changes in support patterns are bound to occur. Table 13 confirms this expectation: the share of semi-stable and unstable paths is about 6/7. Completely unstable paths are very rare. About one in every 7 municipalities has undergone no essential change in support distribution among major parties. This is indeed a remarkable degree of stability since it not only means that the same party has received the maximum support but also the shares of the second

Table 13: *The Distribution of Municipalities over Path Types*

Path type	Number of municipalities	Percentage of municipalities
abs. stable	63	14
semi-stable	232	51
unstable	155	34
compl. unstable	4	1

and third largest parties have remained largely constant in those municipalities for more than 20 years. About 1/3 of the municipalities have witnessed at least three changes in distribution patterns over the observation period. This makes them clearly more contestable than the semi-stable municipalities. One has to bear in mind, though, that a change of distribution pattern does not always imply a change in the largest vote-getting party.

The paths traversed by the municipalities over the seven elections are thus varied, but not as much as one might expect. Focusing only on the 10 most common patterns, one could expect on purely *a priori* grounds that each of the 10^7 paths were equally probable. This is blatantly not the case in reality. To demonstrate this we define, for a set of municipalities, the path change as the number of times the cluster characterizing the municipality changes from the previous one as a result of an election. For example, in a set consisting solely of completely unstable stable municipalities, the number of changes is 6. For a municipality which is in the same cluster throughout the observation period this number is 0. Table 14 gives the cumulative distribution of municipalities over path changes.

About 1/3 of the absolutely stable municipalities are of cluster 1 type with KESK the dominant party. Altogether 19 municipalities are of this type. They are primarily located in northern Ostrobothnia region and in Lapland. Also many of the other absolutely stable municipalities are characterized by KESK's dominant position. For example, 6 absolutely stable municipalities were of cluster 4 variety, *i.e.* characterized by very strong KESK support followed by KOK and SDP, but with weak VAS support. These municipalities are scattered in different parts of rural southern Finland. Of other types of absolutely stable municipalities, a relatively frequent one is that consisting of cluster 9 and one consisting of cluster 3. The former is characterized by RKP's absolutely dominant position, while in the latter ones the leading party is SDP. In the former group we find Liljendal, Maksmamaa, Pedersörenkunta, Pernaja and Vöyri, all Swedish-speaking coastline municipalities. The SDP dominated absolutely stable municipalities are industrial cities of the southern part of Finland, Harjavalta, Kotka, Mänttä and Valkeakoski.

Table 14: *The Distribution of Municipalities over Path Frequencies*

Path of changes	Number of municipalities	Cumulative percentage of municipalities
0	63	14
1	211	47
2	315	70
3	393	87
4	438	97
5	448	99
6	452	100

At the other end of the spectrum are the most volatile municipalities. They are four in number and all located in south-western Finland: Ikaalinen, Merimasku, Orimattila and Kylmäkoski. Of these the last mentioned three are rural municipalities.

10. Conclusion

Utilizing the clustering algorithm to identify classes of constituencies with similar party support in three parliamentary elections, we found out that with less than ten different clusters one is able to account for nearly all the constituencies of England, Scotland and Wales. In fact, just of couple of clusters are needed to characterize nearly all of the Scottish and Welsh constituencies. The over-time variation in the clusters that a constituency belongs to in different elections suggests that Scotland has the largest percentage of constituencies that remain in the same cluster throughout the observation period, with Wales coming second in this regard. The share of volatile constituencies is, perhaps somewhat unexpectedly, also the largest in Scotland with England following and Wales coming last.

Large portion of constituencies in all regions underwent no significant change in the support distribution. In all regions clearly more than 1/3 of the constituencies remained in the same cluster. Obviously the local competition constellation is very stable in those constituencies. The change in the governing party has not, then, been a consequence of anything that happened in them. Those constituencies, on the other hand, that in 1997 switched from Conservative or LibDem domination to Labour one, were obviously crucial in bringing the government change about.

Does our analysis shed some new light on electoral campaigns in Great Britain? Obviously all candidates try convince their potential voters that they have a real chance of getting elected and that everything depends on just their supporters. In that regard there is probably not much variation between constituencies. What our analysis suggests is that in terms of electoral support constellation, the constituencies can be divided into relatively homogenous groups with distinctive support distribution. This distribution not only distinguishes constituencies according to the dominant party but takes the support distribution among others also into account. The dynamics tells us what types of movements have occurred between support constellations from one election to another. This is another way of measuring the chances of parties to gain or lose ground in electoral campaigning.

Concerning Finnish municipal elections one can say that the local elections in a country with hundreds of municipalities presents the observer a plethora of voting data. The variety can be downright bewildering especially if one chooses to observe electoral trends in time intervals consisting of several elections. Some organization to the great variety can be achieved by suitable classification methods. The crux is, of course, that the resulting classes are different from each other in some relevant sense. Equally important is that the classes not contain units

which are essentially different from each other. In the preceding we have focused on the Finnish municipal elections over a time span of more than 20 years. This span includes 7 elections, each in more than 450 municipalities. Using a clustering algorithm applied in several other contexts, we have identified the most common municipal patterns of party support in those elections. Moreover, we have sought the most common patterns of overtime variation in those patterns. It turns out that out of the 10 most common patterns of major party support distribution, KESK is the dominant party in 7 patterns. That this party is far less uncontested in nation-wide elections, is a consequence of the fact that a large majority of Finnish municipalities are small rural ones where the KESK support has traditionally been strong. The strongholds of the other two main national parties, SDP and KOK, are in urban municipalities which are more populous but relatively few in number.

From the viewpoint of electoral competition, the share of absolutely stable and semi-stable municipalities is large, about 2/3. In 63 municipalities there has been no change in support pattern in 7 past elections. This means that in those municipalities, not only has the support of the largest party but also that of its main contestants remained rather constant despite the profound changes in economic, social and political life of the country. At the other end of the spectrum we have 4 extremely volatile municipalities, *viz*. ones where the support distribution pattern has changed in every election.

APPENDIX

Algorithm for clustering curves

Let A be a set of districts. To each $a \in A$ corresponds an ordered n-tuple $Z_a = \{z_1^a, \ldots, z_n^a\}$ of data — observations (share of votes for each party i) characterizing the object.

Let us construct on each Z_a 'a curve', which goes trough the points $z_1 a, \ldots, z_n a$, i.e., the function f^a with $f^a(i) = z_1^a$ for all $i = 1, \ldots, n$. For simplicity consider the case when is a piece-wise linear function, i.e.,

$$
\begin{aligned}
& f^a(x) = \{k_i^a x + t_i^a, \quad \text{if} \quad i \le x \le i+1\}, \\
& k_i^a i + t_i^a = z_i^a, \\
& k_i^a (i+1) + t_i^a = z_{i+1}^a, \\
& i = 1, \ldots, n-1.
\end{aligned}
$$

Now to each interval $[i, i+1]$ put into correspondence the pair $V^a = (k_i^a, l_i^a)$ and to each f^a – the vector $V^a = (V_1^a, \ldots, V_n^a)$. Introduce now the function $E(V^a, V^b)$ which depends on the distance (e.g., euclidean one) $r(V^a, V^b)$ between the vectors V^a in the space of vectors V^b in the space of vectors $\{V^a\}_{a \in A}$ in the following way

$$E(V^a, V^b) = \exp(-\alpha \cdot r(V^a, V^b)).$$

Consider now the clustering $\{X_i\}$ on the set of vectors $\{V^a\}_{a \in A}$ such that

$$\sum_i \Big(\sum_{V \in X_i} E(V, X_i) \Big/ \sum_{V \in A \setminus X_i} E(V, X_i) \Big) \to \max_{\{X_i\}},$$

where $E(V, X_i) = \sum_{V^b \in X_i} E(V, V^b)$.

The construction of the clustering which gives the extremum to this functional can be done by the algorithms provided in Mirkin (1996).

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