

Proportional Representation in Scandinavia: Implications for Finland

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1. Introduction

The objectives of this paper are: to apply a new graphical method to elections for the second (or single) legislative chamber, to evaluate the performance of Scandinavian electoral systems, and to contribute to the current re-evaluation of the Finnish system.

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1. Introduction

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Political scientists have for a long time confronted the problems raised by electoral systems. How does the electoral system relate to the party system? What are the political consequences of electoral laws? According to Duverger (1954, 239)

' . . . the simple-majority single ballot system encourages the two-party system; on the contrary both the simple-majority system with second ballot and proportional representation favour multipartism.'

But many scholars have shown that the relationship is not so simple, especially in the most famous empirical study by Douglas W. Rae (1967) in which he analyzes election results from twenty western democracies. However, Rae's analysis is based for the most part on a comparison of majority and proportional systems. The question of differences within the 'family' of proportional systems is not considered. What happens if a country changes one proportional electoral rule for another? If a country wishes to reduce the number of parties to ensure a more effective functioning of its decision-making system, can this goal be reached by another electoral rule?

The Scandinavian experience offers a highly interesting research area in this respect. Around 1950, Denmark, Norway and Sweden changed from the d'Hondt method of allocation to the modified Sainte Lague rule. The consequences of this shift represent the primary focus of this article. The results are especially important when we keep in mind the present discussion in Finland on constitutional reform, which also includes a re-evaluation of the electoral system. What can Finland learn from the Scandinavian experience?

Representative democracy has many common features in all Nordic countries. All five countries apply the list system of proportional representation in multi-member constituencies. However, there are certain important differences in transforming votes into parliamentary seats. Denmark, Norway, and Sweden apply the odd-number Sainte Laguë rule modified through the stipulation of a 1.4 barrier against party fragmentation (divisors 1.4, 3, 5, and so on). Denmark and Sweden further reserve a certain number of seats in a national pool to be used as so-called adjustment seats. Finland and Iceland use the d'Hondt system under which the total number of votes cast for each party list is divided in turn by 1, 2, 3, . . . , etc. The well-known fact that the d'Hondt system favours the larger parties has given rise in Finland to pressures to change the electoral rule to the more proportional system adopted in the other Scandinavian countries.

Empirical studies of some Nordic voting data, using different electoral rules, lead to the same conclusions: the d'Hondt method systematically favors larger parties, and if proportional representation is the ideal, then the modified St. Laguë system seems to be preferable on theoretical

grounds (see Rokkan and Hjøllum, 1966: 237–246; Laakso and Taagepera, 1977, Loosemore and Hanby, 1971: 467–477). However, there are secondary features which have a marked effect on the functioning of the basic rule: an ability to form electoral alliances attenuates the disproportionality inherent in d'Hondt, while nationwide adjustment seats may abolish it altogether. On the other hand, a threshold clause makes even the St. Laguë system more disproportional. The size of electoral districts can play a major role, if there are no adjustment seats: a proportional representation system (be it d'Hondt or St. Laguë) approaches a simple plurality system when there are very few seats per district.

The effect of party size (in terms of its share of votes) has been mostly discussed in the form of a dichotomy: are large or small parties favored by a given electoral system? But one could conceive of a system that favors middle-size parties at the expense of both extremes. We need a way to represent empirically the effect of party size without any theoretical preconceptions.

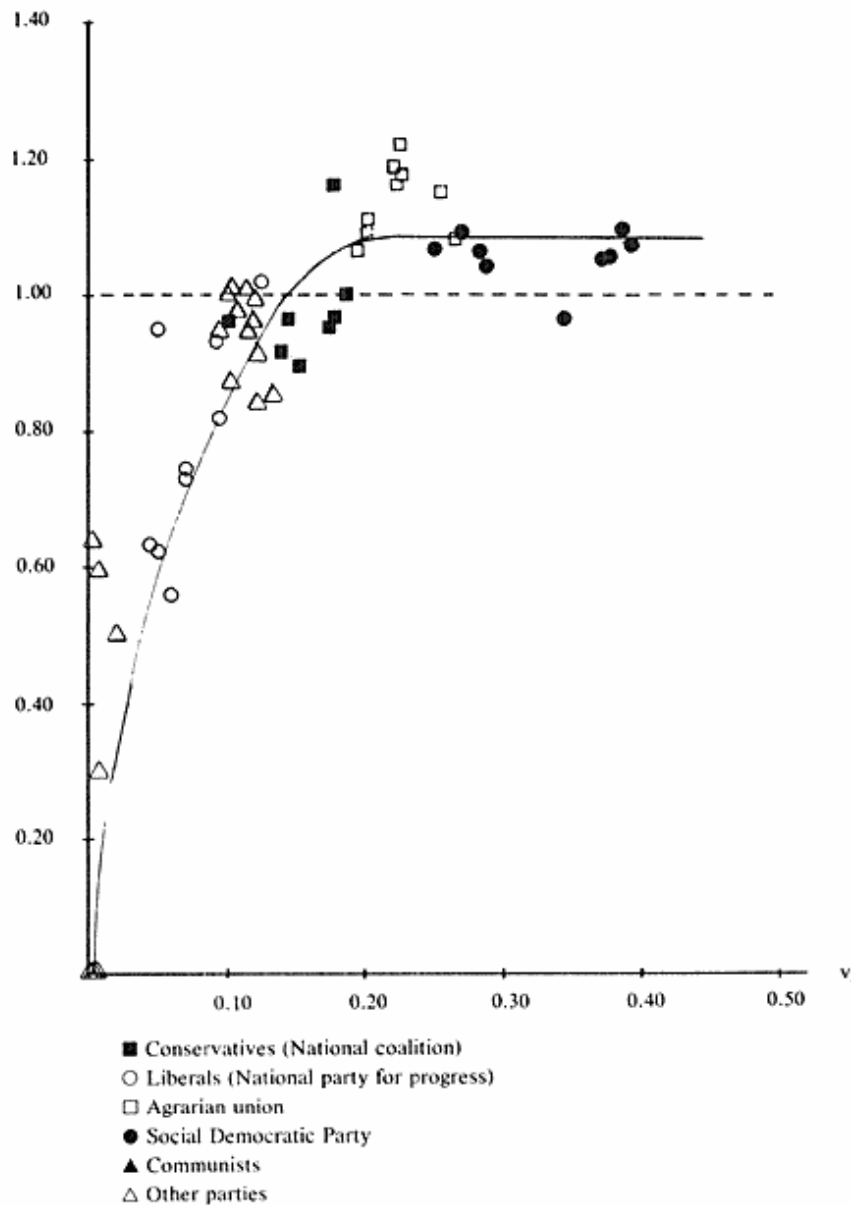
We will first present 'proportionality profiles' of Scandinavian electoral systems under the d'Hondt and St. Laguë rules, and try to characterize the resulting differences. In the second part, systematic and random deviation from proportionality is defined and calculated for the four Scandinavian countries. For Denmark the time period of elections is 1932–1973: eight elections when d'Hondt was applied and similarly eight elections under Sainte Laguë. For Finland we have chosen two periods before and after World War II (1919–1939, and 1945–1972) to see if there are changes over time when the same electoral system is applied for a long period. For Norway the elections extend over the periods 1930–1949 (5 elections, d'Hondt with electoral alliances allowed) and 1953–1973 (6 elections, the modified Sainte Laguë rule). Finally, for Sweden the time periods chosen are 1921 to 1948 (8 elections, d'Hondt) and 1952 to 1973 (6 elections with the modified Sainte Laguë rule, 2 elections with a 4% vote threshold and modified Sainte Laguë).

2. Proportionality Profiles

Our procedure is the following:

- 1) For each party, calculate the ratio $A_i = s_i/v_i$ of its share of seats (s_i) and its share of votes (v_i),
- 2) Plot this 'advantage ratio' versus the share of votes (v_i)

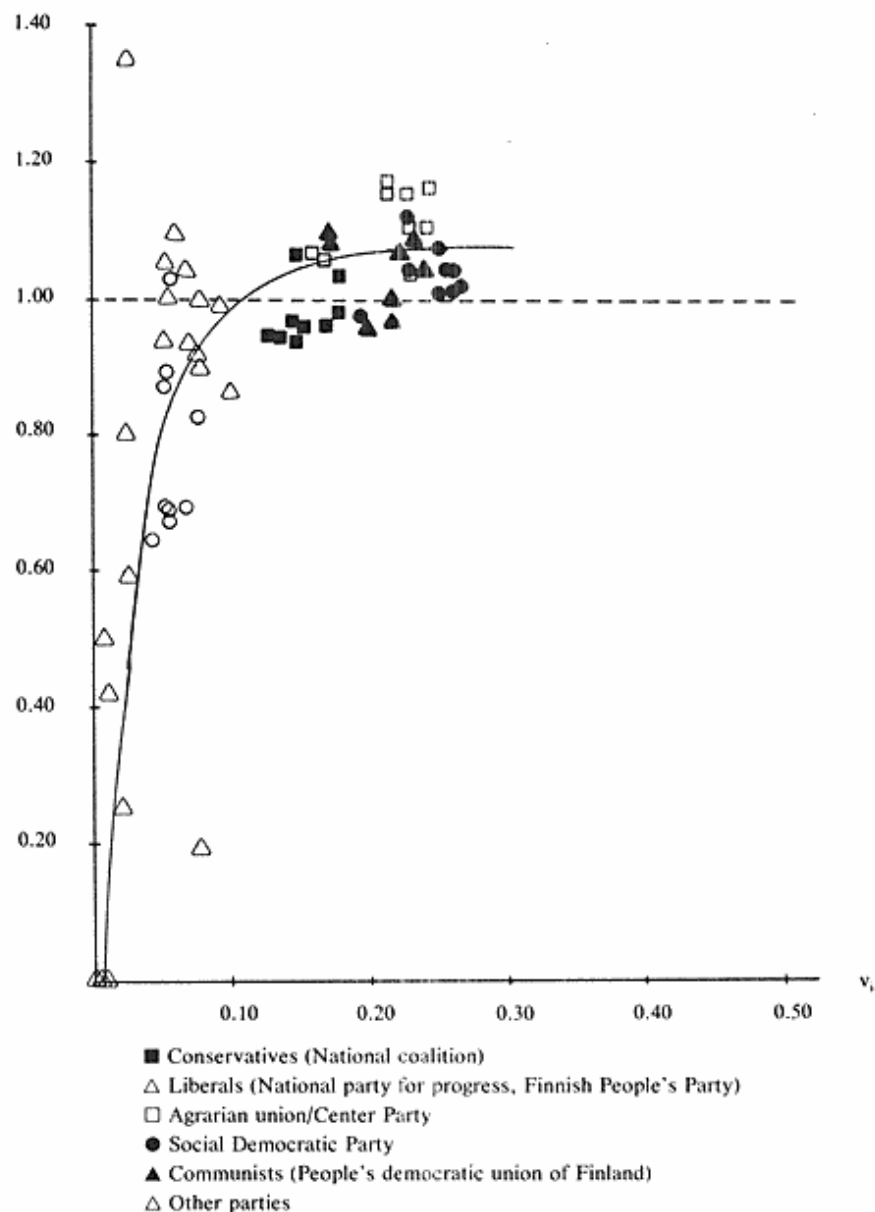
The advantage ratio A_i shows how much a party is favored/disadvantaged by the electoral rule. If $A_i > 1$, the seat share of a party is greater than its



1 a A_i vs. v_i in Finnish parliamentary elections, 1919 to 1939 (d'Hondt rule with electoral alliances permitted)

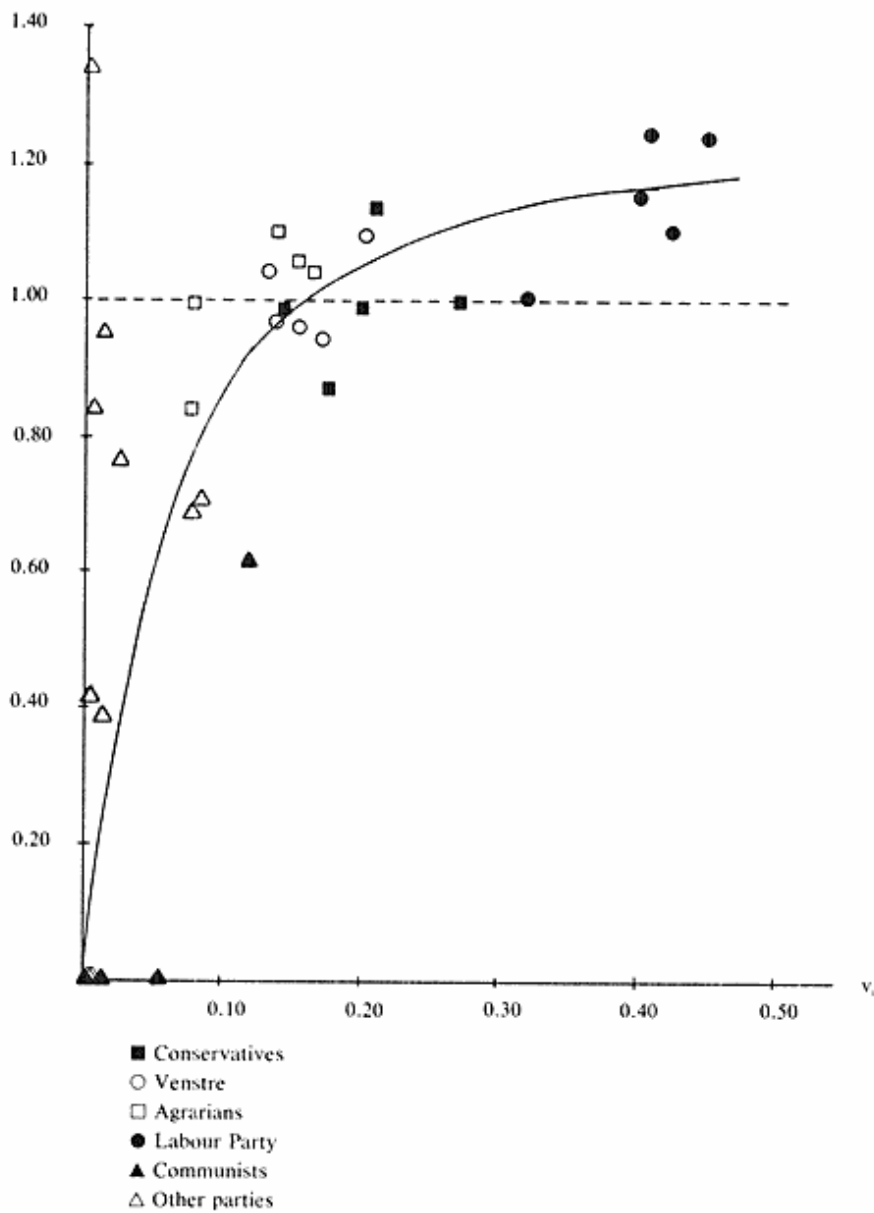
vote share: if $A_i < 1$, the reverse conclusion holds. Note that perfect proportionality requires the equality of s_i and v_i , so that $A_i = 1$. Our advantage ratio is analogous to Dahl's 'index of advantage' (Dahl, 1956:114). If we plot A_i vs. v_i we can see how the ratio depends on the size of a party's share of the vote. If the correlation is positive the electoral rule favors large parties: a negative correlation leads to the opposite conclusion.

In Figure 1 the plot A_i vs. v_i is presented for four Scandinavian countries. Most of the d'Hondt systems show a common pattern of high ad-



1 b A_i vs. v_i in Finnish parliamentary elections, 1945 to 1972 (d'Hondt rule with electoral alliances permitted)

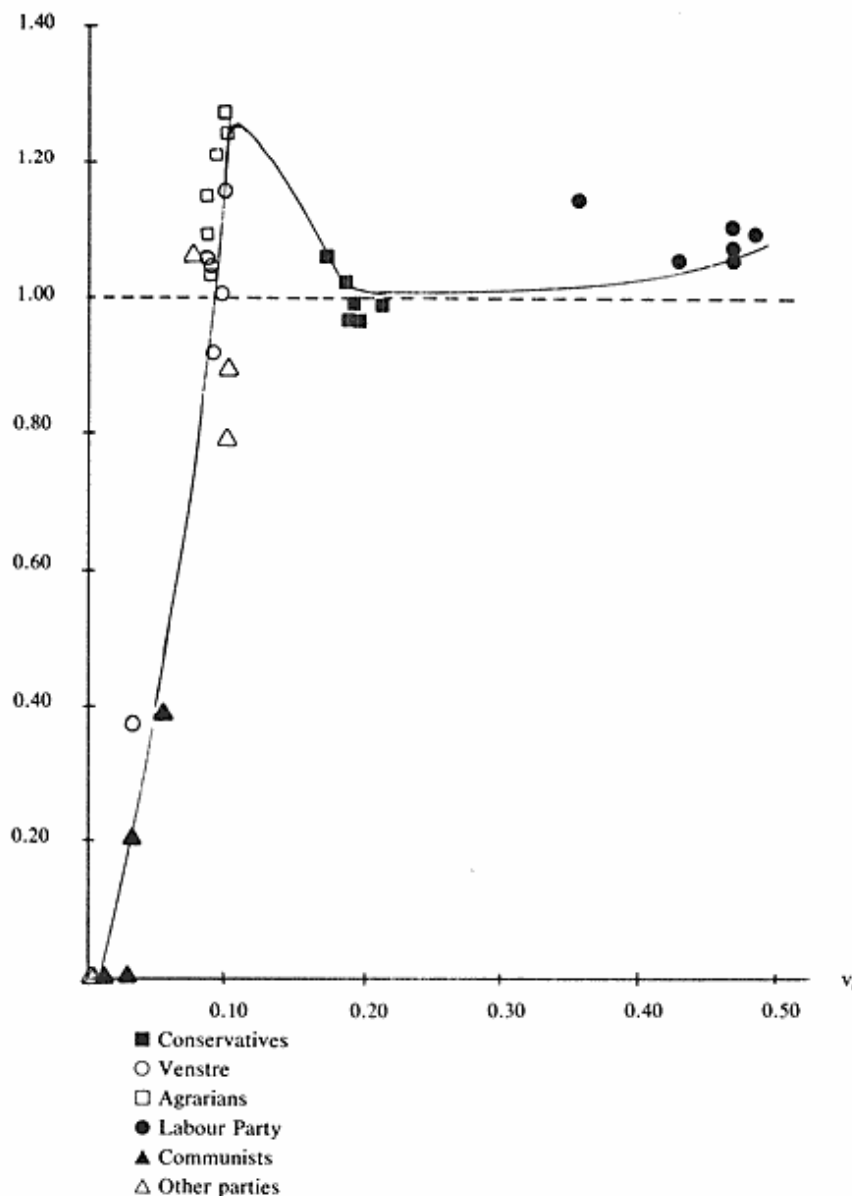
vantage ratio for large parties and a gradually decreasing one for smaller parties (Figures 1a, b, c, and e). The general trend curve has been sketched into these plots without aiming at a best least-square fit (note that before carrying out such a least-square fit we would have to decide on the general shape of the curve to be fitted, a decision of a theoretical nature that we prefer to avoid at the present stage). We tentatively conclude that this is the typical proportionality profile for pure d'Hondt systems. The break-even point (where $A_i=1$) tends to occur for vote shares ranging from 12 to



1 c A_i vs. v_i in Norwegian parliamentary elections, 1930 to 1949 (d'Hondt rule with electoral alliances permitted)

18%. Agrarian center parties tend to have an unusually high advantage for a given v_i (Figures 1a and e), reflecting a favorable geographical distribution of their votes. The advantage ratio of large parties tends to level off at $A_i = 1.10$ to 1.15 . Systems with large dominating parties (Figures 1a, c, and e) seem to have the same profile as the Finnish one where no parties have more than 30% of the vote (Figure 1b). Very small parties tend to have an advantage ratio close to zero.

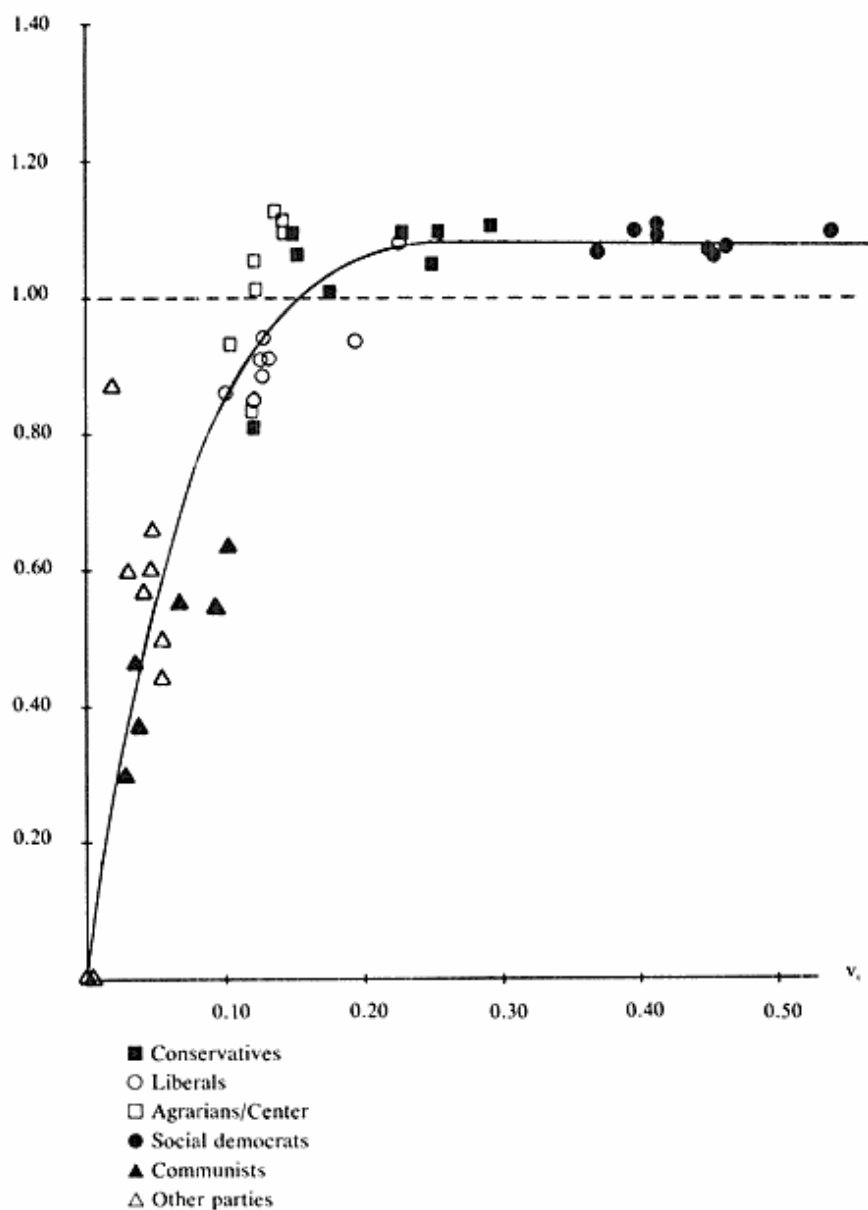
In contrast to all other d'Hondt systems, Denmark, which uses nation-



1 d A_i vs. v_i in Norwegian parliamentary elections, 1953 to 1973 (modified Sainte Laguë with electoral alliances prohibited)

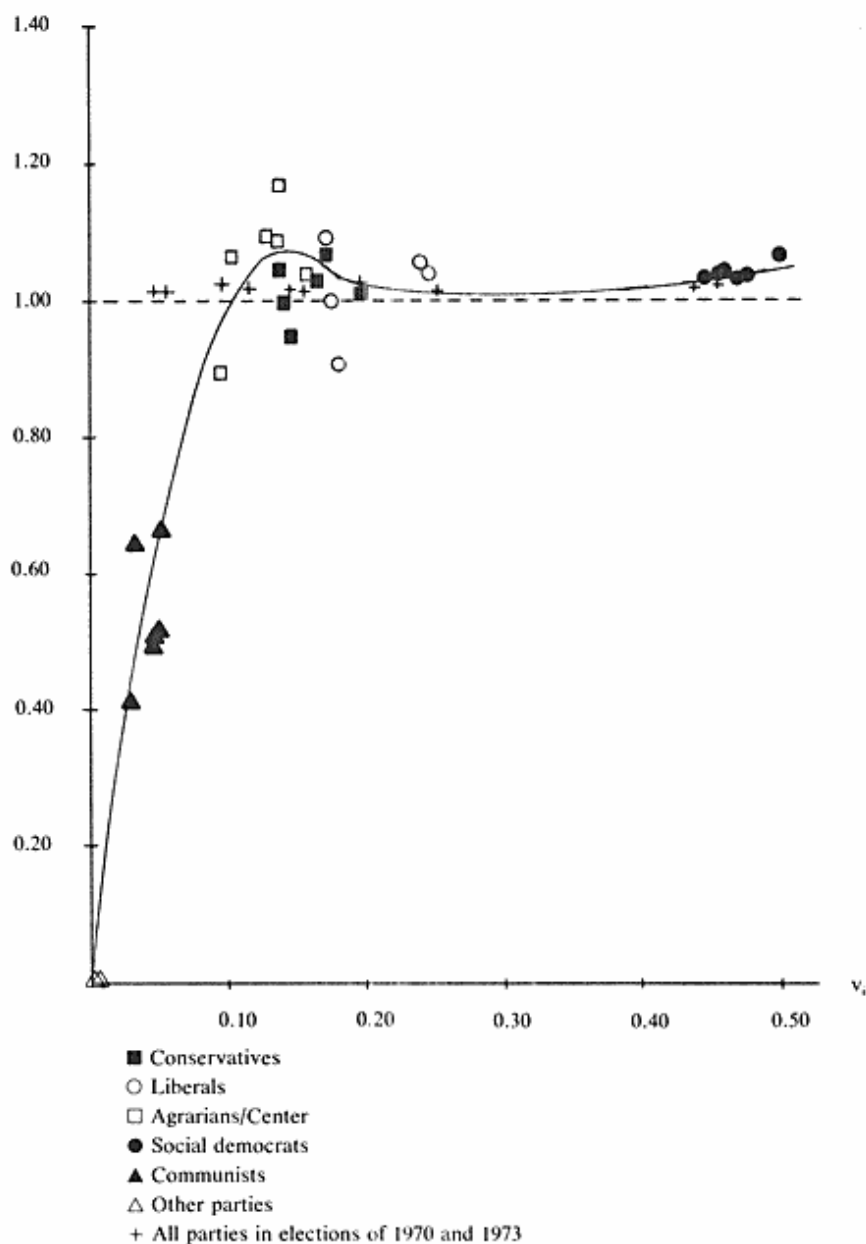
wide adjustment seats, presents a completely different profile. The advantage ratio seems to be close to unity irrespective of party size, except that the scatter of individual A_i values increases for small v_i . We tentatively conclude that adjustment seats override the basic d'Hondt characteristics to such an extent that it may be misleading to describe it as a d'Hondt system as far as the political results of electoral rules are concerned.

The two modified St. Laguë systems with no adjustment seats (Figures



1 e A_i vs. v_i in Swedish parliamentary elections, 1921 to 1949 (d'Hondt rule)

1d and f) also offer a common pattern that may be typical of St. Laguë: the advantage of large parties is abolished (as intended by St. Laguë), and the modification with 1.4 as the first divisor prevents the opposite advantage to small parties (see Rokkan, 1968:14). In fact, very small parties again have near-zero A_i . The outcome is a moderate (A_i around 1.05) but fairly clear advantage for medium-size parties (those with 7 to 15% of the vote). Part of the peak is due to the aforementioned geographical advantage that agrarian parties tend to have, but other medium-size parties also tend to do



1 f A_i vs. v_i in Swedish parliamentary elections, 1952 to 1973 (modified Sainte Laguë, 1952 to 1968; modified Sainte Laguë with adjustment seats, 1970 to 1973).

relatively well under the modified St. Laguë rule.

The Danish case of modified St. Laguë with adjustment seats (Figure 1h) has a profile quite different from other St. Laguë systems. In fact, this profile is very similar to that of the earlier d'Hondt system with adjustment seats (Figure 1g): $A_i=1$, except for extremely low v_i where A_i is close to zero for all systems considered.

The discussion of electoral systems in the Nordic countries has mainly operated with two formulae: d'Hondt and modified St. Laguë. Our pro-

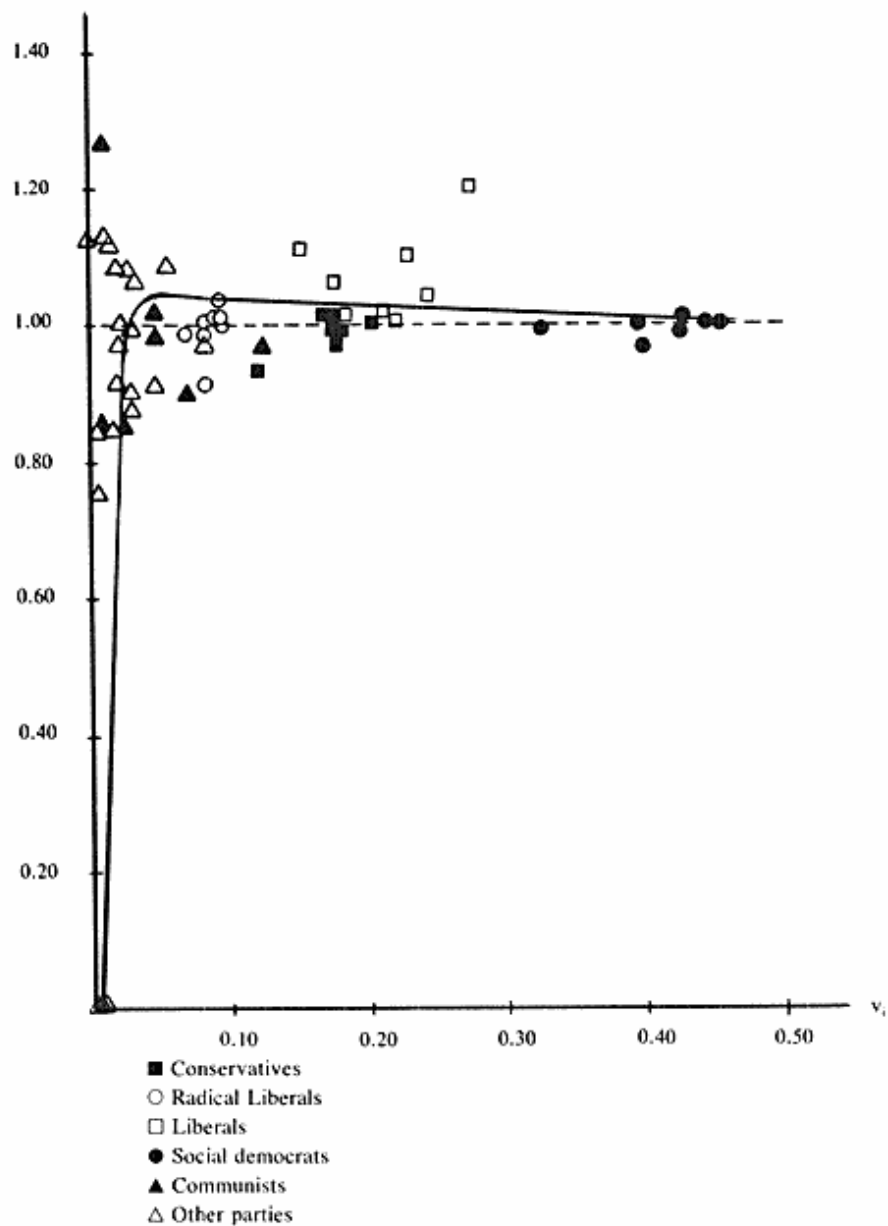
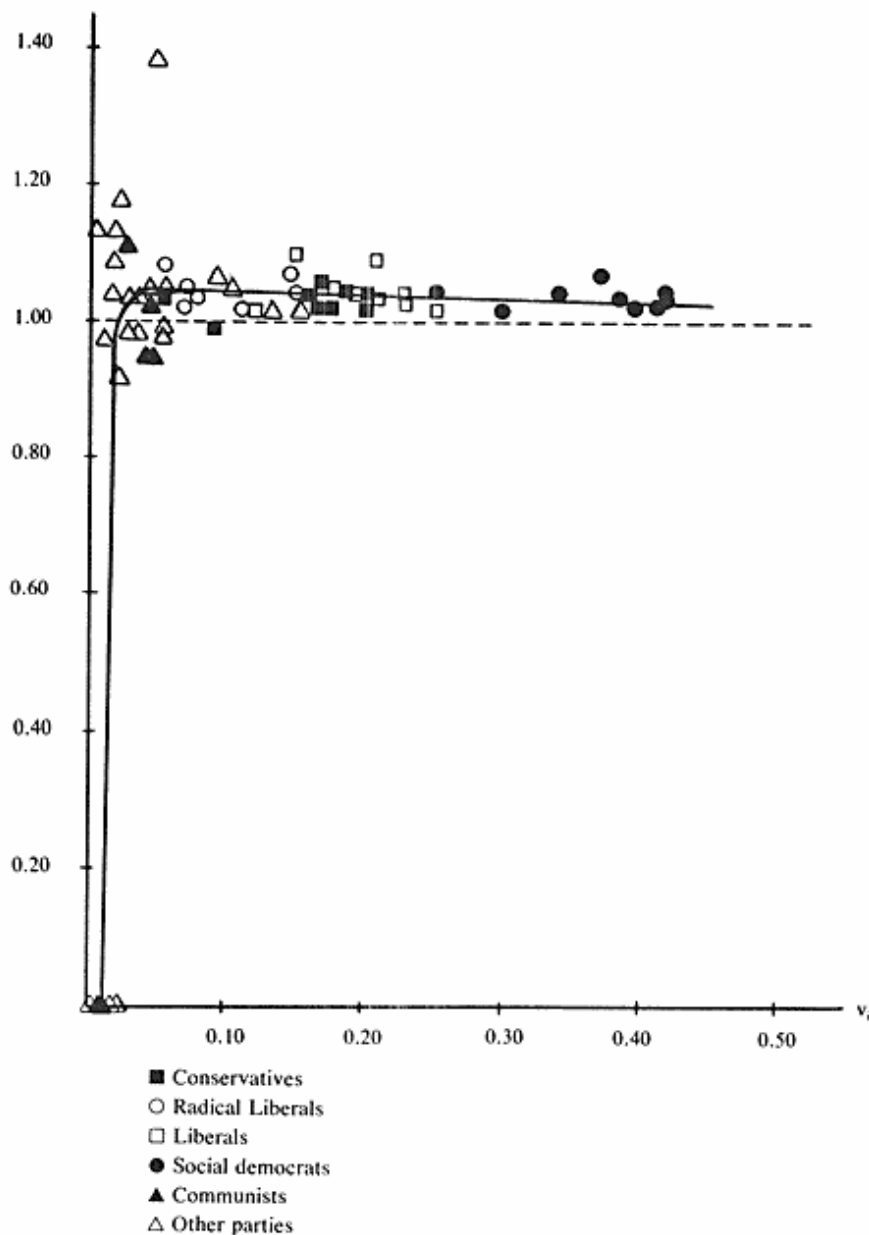


Fig. 1. A_i vs. v_i in Danish parliamentary elections, 1932 to 1953 (d'Hondt rule with adjustment seats)

proportionality profiles suggest that, as far as effect on proportionality is concerned, we should distinguish between *three* distinct patterns:

1. Systems involving nationwide adjustment seats.
2. Modified St. Laguë (without adjustment seats).
3. d'Hondt (without adjustment seats).

A fourth variant may have been introduced in 1969 by the Swedish combi-



1 h A_i vs. v_i in Danish parliamentary elections, 1953 to 1973 (modified Sainte Laguë with adjustment seats)

nation of adjustment seats with a vote threshold, but data are still limited. The likely profile is $A_i=1$ (similar to other adjustment seat systems), with a sudden drop to $A_i=0$ at the threshold.

The post-1969 Swedish electoral system seems to involve a needlessly complex maze of unintended 'checks and balances': the large later divisors (3, 5, 7, . . .) of St. Laguë, originally intended to keep down the large party advantage, are superfluous since adjustment seats ensure an even advantage at any party size over the vote threshold. The modified first

divisor (1.4), originally intended to keep down small party advantage, is superfluous since the threshold takes drastic care of these small parties. The somewhat simpler d'Hondt system would achieve exactly the same result, if employed in conjunction with adjustment seats and a vote threshold.

The lesson for Finland seems to be that the quest for proportionality would be best served by the introduction of nationwide adjustment seats. The choice between d'Hondt and St. Laguë is unimportant when adjustment seats are used, as shown by the Danish experience. But this choice may be unimportant even without adjustment seats, for the following local reasons: present-day Finland lacks parties in the 7 to 15% vote range, which could profit from a switch to St. Laguë, and it also lacks large parties (over 30% of the vote) which would clearly profit from the d'Hondt system. It seems from our profiles that Finland is not likely to gain anything from a switch from d'Hondt to St. Laguë (except a feeling of being part of the Nordic crowd); nor would it lose anything (except for the costs of a changeover to more complex calculations). The real issue is whether to complement the existing d'Hondt framework with adjustment seats and/or a vote threshold (either through an explicit threshold or through reduced district size).

3. Systematic and Random Deviation from Proportionality, and Effective Number of Parties

We have presented in detail the measures of the random and systematic deviation from proportionality in a separate article (Laakso and Taagepera, 1977). Because the measurement is the same here we need refer only briefly to analytic methods involved.

Usually the deviation from proportionality is defined as follows (Loosemore and Hanby, 1971).

$$D_1 = \frac{1}{2} \sum_{i=1}^n \left| s_i - v_i \right| \quad (1)$$

where n = the number of parties in elections,

s_i = the seat share of the i -th party,

v_i = the vote share of the i -th party

Perfect proportionality is only reached ($D_1 = 0$) when for all i the seat share is equal to the vote share. If a party with zero votes won all the seats, then D_1 would reach its maximum of 1.

Starting from the assumptions originally presented by Henri Theil the seat share of the i -th party should rationally be close to the value given by the formula (Theil 1969: 521–525)

$$s_i = \frac{v_i^a}{\sum_{j=1}^n v_j^a} \quad (2)$$

The larger the value of a , the more large parties are systematically favored. With $a = 1$ perfect proportionality is obtained and with $a = 3$ we have the famous ‘cube law’ which discriminates heavily against non-local small parties. The formula (2) describes a *systematic* distribution of seats.

Random deviation can now be expressed, in an analogy to Equation (1), by

$$D_a = \frac{1}{2} \sum_{i=1}^n \left| s_i - \frac{v_i^a}{\sum_{j=1}^n v_j^a} \right| \quad (3)$$

For a given set of votes (v_i) and the seat distribution (s_i), D_a can be calculated for any value of a . The task is to find the ‘optimal’ value for a (denoted by a_{opt}) so that D_a is minimized. The residual deviation is designated as D_{min} which represents the *random* deviation from proportionality in the sense that it profits neither small nor large parties on the basis of their size.

Thus the *systematic* deviation is expressed by

$$D_{sys} = D_1 - D_{min} \quad (4)$$

where D_1 represents the total deviation from proportionality. Because D_{sys} does not tell us whether large or small parties are favored, a_{opt} may be a better measure of systematic disproportionality. For $a_{opt} > 1$ we know that larger parties are favored, and if $a_{opt} < 1$, smaller parties win an extra bonus from the electoral rule. Note that the small middle-size party bonus of the modified Sainte Laguë rule would be treated as random deviation in this context.

The effective number of parties is defined as

$$N = 1 / \left(\sum_{i=1}^n p_i^2 \right) \quad (5)$$

Table I. Deviation from Proportionality and Effective Number of Parties in the Four Scandinavian Countries (Mean Values)*

Country	Deviation from proportionality				Effective number of parties	
	Total (D ₁)	Random (D _{min})	Systematic (D _{sys})	a _{opt}	Votes (N _v)	Seats (N _s)
DENMARK						
d'Hondt (1932-53)	.020	.019	.001	1.01	3.82	3.75
mod. St. Laguë (1953-73)	.035	.029	.006	1.04	4.46	4.18
FINLAND						
d'Hondt (1945-72)	.044	.031	.013	1.12	5.36	4.98
NORWAY						
d'Hondt (1930-49)	.081	.037	.044	1.20	3.92	3.27
mod. St. Laguë (1953-73)	.060	.044	.016	1.11	3.78	3.35
SWEDEN						
d'Hondt (1921-48)	.057	.032	.025	1.12	3.54	3.16
mod. St. Laguë (1952-73)	.033	.026	.007	1.05	3.34	3.15

* Calculations based on data from Rokkan and Meyriat (1969) and Pesonen (1972).

where p_i is the fractional share of votes or of seats for the i -th party. The summation is over all n parties which actually obtain seats or votes. The effective number of parties on the vote level (N_v) is usually larger than that on the seat level (N_s) (see Laakso and Taagepera, 1977 b).

Table I gives the mean deviation from proportionality and effective number of parties for the four Scandinavian countries. The values for Finland are adopted from Laakso and Taagepera (1977). The election years under d'Hondt and St. Laguë are the same as in Figure 1, except for Finland.

In Denmark elections under the d'Hondt rule with additional seats are very proportional (years 1932-1953). The a_{opt} value is quite near 1.00 and the total deviation D_1 is also small. Systematic deviation from proportionality (D_{sys}) is minimal because of small values of a_{opt} . The very high proportionality of the d'Hondt rule in Denmark is explained by the use of the additional adjustment seats. The adoption of the modified St. Laguë rule paradoxically made elections more disproportional, although a_{opt} is still quite low. After the change in the electoral rule the D_{sys} value also grew.

The results from Finland based on the same election results but on different hypothetical electoral rules show that, if Finland had applied the

Table II. The Proportion of Systematic Deviation from Total Deviation

	$D_{\text{sys}}/D_1 \cdot 100$	
	d'Hondt	mod. St. Laguë
Denmark	5.0%	17.1%
Finland	29.5%	–
Norway	47.5%	26.7%
Sweden	43.9%	21.2%

Sainte Laguë rule, elections would have been much more proportional but the number of effective parties on the parliamentary seat level would have grown markedly (Laakso and Taagepera, 1977). In Denmark the average value of the effective number of parties has increased on both the seat (N_s) and vote (N_v) levels. Whether this tendency is due to the change of the electoral rule is doubtful.

In Norway the results agree with those calculated for Finland. Adoption of the modified Sainte Laguë rule has made elections more proportional. This can be seen from the decrease in the a_{opt} values and in the difference ($N_v - N_s$). Although there is a slight decrease on the vote level (N_v), the number of effective parties in Norway has remained constant at the seat level (N_s) because the modified Sainte Laguë rule is more proportional than d'Hondt. It should be noted that the mean value of a_{opt} under the d'Hondt method (1.20) is slightly larger in Norway than in Finland (1.12 with electoral alliances permitted). If Finland had applied the modified St. Laguë, its a_{opt} would have been 1.07 compared to Norway's 1.11.

In Sweden the d'Hondt rule has been markedly more disproportional than the St. Laguë method. The mean a_{opt} value for d'Hondt is 1.12 (as in Finland) while for the modified St. Laguë in elections 1952–1968 it was 1.06. Thereafter the system of additional nationwide seats has further reduced the deviation from perfect proportionality, and if we also take these elections into account the mean value for a_{opt} since 1952 is 1.05. These results closely resemble the theoretical calculations for Finland. In Sweden the effective number of parties has decreased under the modified St. Laguë rule on the seat level (N_s), though remaining the same at the vote level (N_v). In this respect the results are analogous to Norway.

It is informative for a comparison of different Scandinavian countries on the basis of their electoral rules to determine how systematic the deviation from proportionality has been. This can be calculated simply on the basis of D_1 and D_{sys} values. The results are presented in Table II.

The results from Norway and Sweden resemble each other. In both countries the D_{sys} values are approximately twice as great under d'Hondt as under the modified St. Laguë rule. In Finland the tendency is the same but the ratio D_{sys}/D_1 is markedly smaller, presumably due to larger electoral districts. In Denmark the effect of supplementary seats overrides the d'Hondt – St. Laguë difference. In fact the modified St. Laguë method gives a more systematic deviation from perfect proportionality than does d'Hondt.

4. The Effect of Electoral Law on the Party System; the Lesson of Scandinavian Experiences for Finland

The problems of comparative research in the area of electoral systems are many, simply because no two countries apply exactly the same electoral system. The Scandinavian countries are quite similar in many respects but there are also many important differences which make general conclusions difficult.

The comparative study of electoral rules has shown the modified St. Laguë to be more proportional than the d'Hondt method. The exception of Denmark is explained by its additional seats system. However, the effect of electoral rules on the effective number of parties is not clear. The problem lies in the interpretation of changes in the N_v values. Does the electoral system affect the fragmentation of the party system on the voter level? The answer cannot be stated explicitly. The electoral rule may be one factor, but its importance is difficult to estimate because of a number of other factors that may have an effect on the dispersion/concentration tendencies in the multi-party system. But if the N_s values remain constant irrespective of the changes in the N_v values (as in Norway and Sweden), the results support the general conclusion presented by Laakso and Taagepera (1977) on the basis of Finnish election data. The problem of N_v was not faced in the study of Finnish elections because N_v was held constant when applying different election procedures to the same voting data.

It is difficult to predict what will happen when the electoral rule is changed. This dilemma is very real for the Finnish constitutional reformers. If we had to give them any recipes, we might offer those tentatively set out in Table III. If they change the electoral rule from d'Hondt to the modified St. Laguë rule, as the Liberal and Swedish People's Party have proposed, then the proportionality of the elections will probably increase. But what are the consequences for the party system? Will it move towards

Table III. Tentative Suggestions on How to Reach Various Political Objectives through a Manipulation of Proportional Representation

For maximal proportionality:

Use a large number of nationwide adjustment seats, with either d'Hondt or St. Laguë rules (cf. Danish data in Figure 1 and Table I).

For slight large party advantage (parties with more than 20% of the vote):

Use the d'Hondt rule, without adjustment seats and with alliances (cf. Norwegian, Finnish and Swedish data).

For slight medium-size party advantage (those with 7 to 15% of the vote):

Use the modified St. Laguë rule without adjustment seats (cf. Norwegian and Swedish data).

Unmodified St. Laguë with a votes threshold would probably be even more successful.

For elimination of very small parties without penalizing medium-size parties:

Use a vote threshold (cf. Swedish data).

For eliminating non-regional small parties without penalizing small regional parties

(such as the Swedish People's Party in Finland):

Use d'Hondt with very small electoral districts (suggestion based on work to be published).

further fragmentation as the results based on the constant N_v values indicate? Or will the development be the same as in Norway and Sweden where N_v remained quite constant after electoral reform? This problem was also noticed in a general form by Douglas W. Rae (1967: 145–146) when he wrote:

' . . . what can development analysis of elections in individual nations add to our understanding of the relationship between party system and electoral law? . . . Is it not likely that a fairly general pattern of development – resting on a large set of variables, only one of which is electoral law – underlies the contemporary party systems we have been discussing?'

The comparative study of electoral systems is necessary in order to predict the political consequences of electoral reform. Such a comparative study needs uniform methods easily applicable to every country's electoral data. We have offered two such possibilities: methods that portray the proportionality profile of a country's electoral rule, and measures to calculate the systematic and random deviation from proportionality.

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