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National Networks in 1976: A Structural Comparison

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This chapter is concerned with the overall patterns of relations between the corporations that result from interlocking directorships in the various countries cited in chapter 1. Because interlocking directorships result from the accumulation of positions by directors, the chapter starts with a comparison of this cumulation for the ten countries. Subsequently, the resulting structure of relations, or lines, between the corporations is given. The overall structures of the networks in the ten countries will be compared in terms of two major aspects: their density and their centralization. A third major aspect, that of clustering, will be dealt with in the national chapters, as the basis of the clustering is different from country to country. Not all relations between corporations based on interlocking directorships can be considered of the same importance, however. The strength of a relation will depend both on the number of interlocks between two corporations and on the combination of positions held by a multiple director in the two corporations. This will be the subject of the second section. The final section will be concerned with the contribution of the primary interlocks to the overall network structures. During this chapter it will become apparent that the overall structures of the national intercorporate networks are shaped quite differently. The following chapters will show the peculiarities of each national network in more detail, particularly with respect to positions of individual corporations and sectors in the national network and the national economy as a whole. Similarities and differences of network positions of certain categories of corporations will be the main subject of chapter 15.

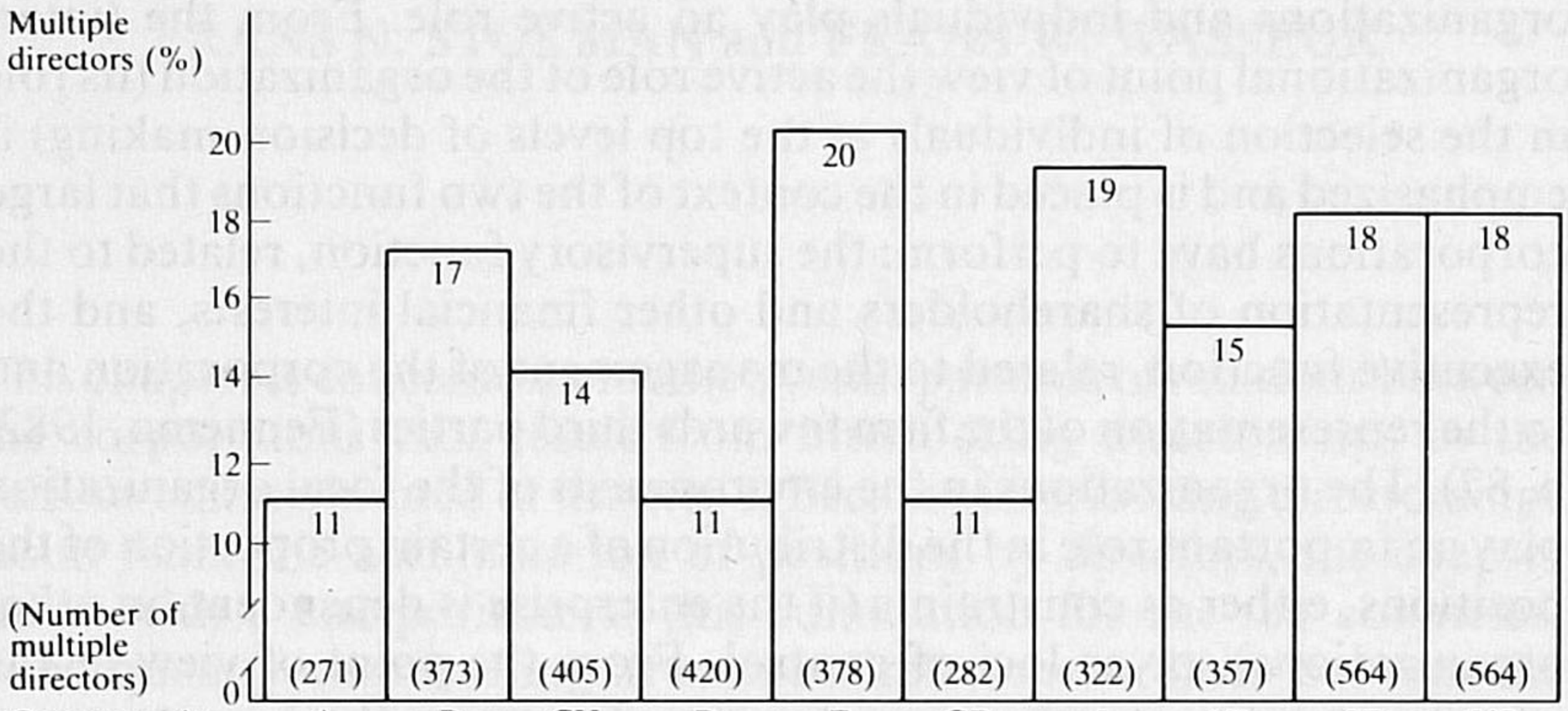
ACCUMULATION OF POSITIONS: MULTIPLE DIRECTORS AND THE NETWORK OF INTERLOCKING DIRECTORSHIPS

In chapter 1, different perspectives have been introduced from which interlocking directorships have been studied (see figure 1.1). Whether interlocking directorships are studied from the point of view of the person or the organization, it is of the utmost theoretical and analytical importance to realize that interlocking directorships are generated by the distribution of positions over people. In this process both organizations and individuals play an active role. From the (inter) organizational point of view the active role of the organization (its role in the selection of individuals at the top levels of decision-making) is emphasized and is placed in the context of the two functions that large corporations have to perform: the supervisory function, related to the representation of shareholders and other financial interests, and the executive function, related to the management of the corporation and to the representation of the firm towards third parties (Fennema, 1982, p. 87). The organizations in the environment of the focal organization play an important role in the distribution of a certain proportion of the positions, either as constraints (if the enterprise is dependent on other organizations), or as loci of control. From the point of view of the person, ambitions and career planning determine the acceptance or refusal of positions offered to him or her. It should be realized, however, that organizational demands and constraints often play an important role in the personal choices, as personal motivations do so in the decision-making process of the organization. This is for the simple reason that decision-making within organizations is carried out by groups of individuals. Theoretically, the personal and organizational perspectives should be seen as two sides of the same coin. As it is useless to discuss which side of a coin is most important and determines its value, so it is useless to argue the predominance of one of the perspectives over the other.

Analytically it is important to start with the distribution of positions over individuals, as this defines the structure of the resulting network between organizations and people. Within a network of interlocking directorships between corporations, only persons with two or more positions – the multiple directors – generate interlocks. Figure 2.1 shows that multiple directors were a small minority of all directors, their proportion varying from 11 to 20 per cent. The largest proportions of multiple directors were observed in France, Italy, Finland,

the USA and Belgium. With the exception of the USA, all these countries had a Latin variant of the European two-board system. These four countries also had the highest mean number of positions per director and this *cumulation ratio* was surprisingly constant over these countries. In the countries with the German variant of the European two-board system, the cumulation ratio was systematically lower than in the Latin variant but showed more variation. There was, however, a striking similarity between Austria and Germany. The two countries with the one-board system were very different: Great Britain had a low percentage of multiple directors and a very low cumulation ratio, whereas the USA scored high on both measures.

Figure 2.1 Multiple directors as a proportion of all directors



(Number of multiple directors)	(271)	(373)	(405)	(420)	(378)	(282)	(322)	(357)	(564)	(564)
Country code	A	B	CH	D	F	GB	I	NL	SF	US
(Number of directors)	(2,430)	(2,203)	(2,999)	(3,943)	(1,931)	(2,682)	(1,737)	(2,321)	(3,110)	(3,108)
(Number of positions)	(2,939)	(3,000)	(3,681)	(4,727)	(2,625)	(3,091)	(2,358)	(2,950)	(4,178)	(3,976)
Cumulation ratio	1.21	1.36	1.23	1.20	1.36	1.15	1.36	1.27	1.34	1.28

Note: Countries are placed in alphabetical order of the official international abbreviations used in all the figures and tables in this chapter.

A high cumulation ratio can be due to a large proportion of multiple directors but also to a high number of directorships per multiple director. If table 2.1 is compared with figure 2.1 it can be seen that a high cumulation of positions by multiple directors was unrelated to the proportion of multiple directors. Great Britain, Germany and Austria had the same low proportion of multiple directors, but the number of directorships held by them was higher in Germany and Austria than the very low figure for Great Britain. A similar observation can be made for the USA and Finland. Both countries had a large proportion of multiple directors but the accumulation of positions in the USA was very low in comparison with Finland. In fact, table 2.1 reveals a great similarity between the USA and Great Britain, the two countries with

the one-board system. The differences between these two countries in figure 2.1 are almost entirely due to the substantially larger proportion of multiple directors in the USA.

Taking figure 2.1 and table 2.1 together, it can be concluded that the distribution of positions over persons was substantially different in each of the three board systems: the Latin system (Belgium, France, Italy and Finland) combined a high proportion of multiple directors with a high cumulation of positions by them; the Anglo-American system (Great Britain and the USA) showed the lowest cumulation of positions by multiple directors; and the German system (Austria, Germany, the Netherlands and Switzerland) was located somewhere between the other two systems but the four countries showed considerable variation in terms of both the proportion of multiple directors and their cumulation of positions.

Table 2.1 Accumulation of positions by multiple directors

	Number of positions (%)							
	2	*3*	*4*	*5*	*6-10*	*11 or more*	*Total*	*Total number of multiple directors*
Austria	65	17	9	4	4	2	100	271
Belgium	57	19	9	6	6	2	100	373
Switzerland	67	19	6	2	5	1	100	405
Germany	60	20	9	5	5	0.5	100	420
France	60	19	9	6	6	0	100	378
Britain	69	21	6	3	1	0	100	282
Italy	63	17	7	5	7	1	100	322
Netherlands	64	17	8	6	5	0	100	357
Finland	61	20	6	6	7	0.4	100	564
USA	64	24	8	3	1	0	100	564

The differences discovered in the cumulation of positions by multiple directors is of considerable importance for the structure of the networks of interlocking directorships, as the number of interlocks is a quadratic function of the number of positions held by a person. A multiple director with 16 positions, as found in both Austria and Italy, creates 120 interlocks between corporations.[1] In Great Britain no multiple director held more than six positions, generating only 15 interlocks between corporations. A substantial part of each network was, therefore, due to the interlocks of a few individuals with a large number of positions. Except for Great Britain and the USA with their low accumulation of positions, more than 60 per cent of all interlocks

were carried by the multiple directors with four or more positions – between a quarter and one-fifth of the multiple directors. These multiple directors are designated 'big linkers'. Table 2.2 clearly reveals that the network of interlocking directorships cannot be analysed without a consideration of the main affiliation of the persons who carry the network: again one side of the coin cannot be studied in isolation from the other.

Table 2.2 Interlocks carried by multiple directors

	Interlocks % carried by multiple directors with				*Total number of big linkers*
	2 or 3 positions	*4 or more positions*	*All multiple directors*		
Austria	25	75	100	(1,238)	50
Belgium	19	81	100	(2,049)	92
Switzerland	38	62	100	(1,314)	56
Germany	31	69	100	(1,629)	82
France	33	67	100	(1,326)	80
Britain	63	37	100	(591)	27
Italy	27	73	100	(1,380)	65
Netherlands	35	65	100	(1,173)	68
Finland	30	70	100	(2,248)	110
USA	59	41	100	(1,308)	69

Note: Absolute numbers are in parentheses.

Before going on to this in the next section and in the national chapters, it is first necessary to compare the overall stuctures of the ten national networks. In this comparison, relations, or lines, between corporations are considered. Such a line can be due to the existence of more than one personal interlock. If two corporations share two directors (if there are two interlocks) the *multiplicity* of the line between the two corporations is said to be 2. Table 2.3 gives the multiplicities of the lines in ten countries. With the exception of France, the countries with the Latin board system showed the highest multiplicities and again Great Britain scored lowest. Multiple interlocks between corporations indicate a strong relation between two corporations and may indicate a shared system of co-optation, which gives strong possibilities of policy co-ordination and shared information. For this reason a number of analyses in the national chapters are confined to the network of multiple interlocks between corporations. In the chapter on Finland (chapter 9), for example, such an analysis made it possible to discover different groups of corporations, connected

through strong, long-standing institutional links. For the first comparison of the networks, however, lines between corporations of the networks will not be differentiated according to their strength, as the main affiliations of the persons who carry the interlocks are also still to be considered. At first, equal weight will be given to all lines.

Table 2.3 Multiplicities of lines

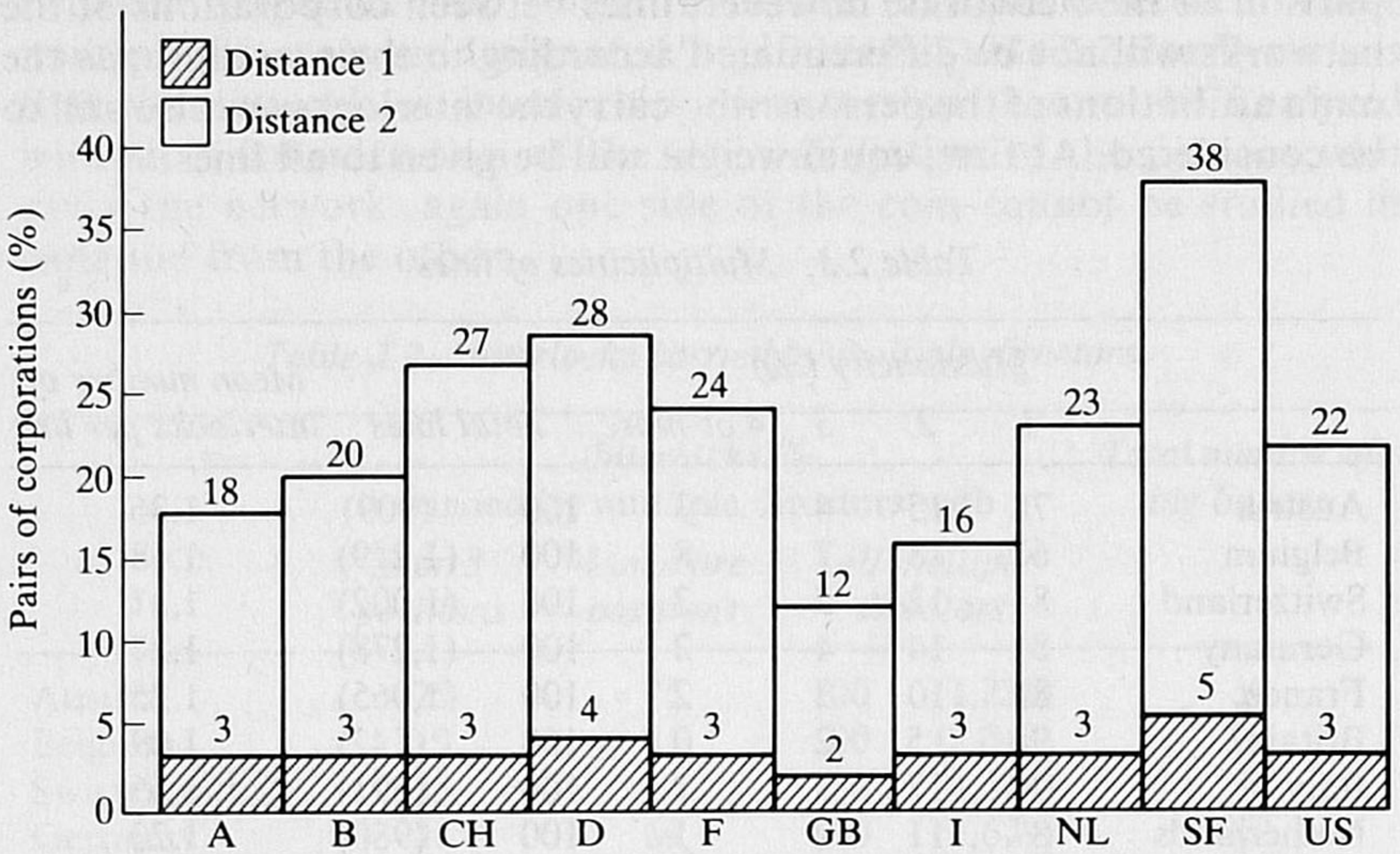
	Multiplicity (%)						*Mean number of*
	1	*2*	*3*	*4 or more*	*Total lines*		*interlocks per line*
Austria	78	15	4	3	100	(909)	1.36
Belgium	67	18	7	8	100	(1,219)	1.68
Switzerland	81	12	5	2	100	(1,002)	1.31
Germany	81	14	4	2	100	(1,278)	1.27
France	85	10	3	2	100	(1,065)	1.25
Britain	94	5	2	0	100	(542)	1.09
Italy	70	17	7	7	100	(891)	1.55
Netherlands	87	11	2	1	100	(980)	1.20
Finland	75	15	5	5	100	(1,498)	1.50
USA	84	13	2	1	100	(1,086)	1.20

Note: Absolute numbers are in parentheses.

At this level of analysis the network of interlocking directorships can be interpreted as at least constituting a communication or information network between corporations. A major aspect of the structure of such a communication network is its *density*, i.e. the fraction of pairs of points (corporations) between which a line exists.[2] Two corporations, connected through a line, have a direct link between their highest decision-making organs. Such corporations with direct access are located at *distance* 1 from one another in the network. If two corporations have no direct access to one another, they may be linked indirectly through other corporations. Of special empirical importance is the proportion of pairs of corporations that are linked with one or more common third corporations. When one or more directors of two corporations meet each other in a third corporation to participate in its policy-making, the first two corporations are said to be located at distance 2 from one another. They have one or more meeting-points in the network. Pairs of corporations at a greater distance from one another can hardly be assumed to communicate through such personal interlocks.

Figure 2.2 shows only a small variation in the densities of the ten national networks. Not surprisingly the British network showed the lowest density (0.02, or 2 per cent). Finland and Germany had a

Figure 2.2 Percentages of pairs of corporations at distances 1 and 2



somewhat higher density than the other countries. The small differences are partly due to the very large number of pairs within each country; if 250 corporations are selected, the total number of pairs is 31,125. A further reason is that the two countries with the highest numbers of interlocks, Belgium and Finland, had the highest average multiplicity of lines, whereas Great Britain had the lowest (see table 2.3). Due to its high multiplicity of lines the Italian network had the lowest number of lines after Great Britain, although Italy had the largest number of interlocks after Finland, Belgium and Germany. In consequence, the different board systems do not result in significantly different densities in the network.

The ten networks reveal more differences with respect to the percentages of pairs of corporations at distance 2, but no systematic differences can be observed between the different board systems. The low percentage for Great Britain can be attributed to its low density. The low percentage in the Italian network, however, is surprising and hints at a low 'efficiency' of the lines in terms of indirect connections. This might well be due to the bipolar structure of the Italian network described in chapter 11.

A second major aspect of the structure of a communication network is its *centralization* – the concentration of relations around a small number of corporations. A first comparison can be made on the basis of table 2.4. The second column contains the numbers of isolated corporations in the networks – the corporations that have no interlocks with any other corporation in their own national network.

Sometimes a few corporations are connected with one or two corporations but have no indirect links with others; the numbers of these corporations are given in the third column. In all countries the bulk of the corporations were contained in one large component, in which they were directly or indirectly linked through interlocking directorships.[3] The numbers involved are given in the fourth column. Within these large components two structural aspects of the networks are compared in the last two columns: density and centralization. The density is the fraction of pairs of corporations at distance 1 from one another, but now measured only within the largest component. The centralization within the largest components is measured with Snijders' index H of graph heterogeneity. This index is based on the variation in the numbers of directly connected corporations for each corporation (the degree variance). If a component contains a number of corporations that are connected with a large number of other corporations and a number of corporations that are connected with only a few of them, then a large variation in these numbers exists and the lines in the graph will be concentrated around a small number of corporations. The measure reaches its maximum value of 1 in a component in which a completely connected centre exists and in which all other corporations are connected with all corporations in the centre without direct mutual connections. The measure is 0 if the variation in the numbers of connected corporations is as expected under random distribution of the lines between the corporations. This index makes it possible to compare the heterogeneity of networks with different numbers of corporations and lines (Snijders, 1981).

Table 2.4 Components in the networks

	Number of corporations				*Density*	*H index*
	Selected	*Isolated*	*In small components*[a]	*In largest component*	*(largest component)*	*(largest component)*
Austria	241	90	4	147	0.08	0.30
Belgium	270	80	8	182	0.07	0.35
Switzerland	250	44	0	206	0.05	0.26
Germany	259	62	2	195	0.07	0.27
France	250	30	0	220	0.04	0.13
Britain	250	61	4	185	0.03	0.12
Italy	247	53	14	180	0.06	0.22
Netherlands	250	56	4	190	0.05	0.24
Finland	237	27	0	210	0.07	0.30
USA	252	24	2	226	0.04	0.13

Note:
a There were only small components of size 2 or 3.

Four countries had only a small number of isolated corporations and a large component of 200 or more corporations: the USA, France, Finland and Switzerland. The small numbers of isolated corporations was mainly due to the relatively small numbers of subsidiaries of foreign enterprises among the selected corporations in these countries. In all countries these subsidiaries tended to be isolated or only very loosely connected with other corporations. In the USA only a few subsidiaries of foreign parents were sizeable enough to be selected, whereas the small number of subsidiaries of parents in the other three countries can be attributed to a strong nationally oriented economic policy by their governments. Of these four countries, two had dense and centralized components: Finland and Switzerland. The levels of centralization and density in Finland were particularly due to the existence of a small number of national, integrative forums that knitted together different ideological and economic groups and which were, in turn, densely connected (see chapter 9). In Switzerland, the banks were the main integrators of the network (see chapter 7). The lower density and centralization in the USA was due to the existence of various regional centres, around which the American network was built (see chapter 13), whereas the predominance of different financial groups was the main reason for the low centralization and density found in the French network (see chapter 10).

The remaining six countries had a large component of less than 200 corporations. In Austria and Belgium in particular, the number of isolates was very large. At the same time, however, these two countries had the most dense and centralized components. The Belgian network was very centralized because of the very strong position of the holding companies, which integrated the traditional financial and industrial sectors (see chapter 8). In Austria, the centralized structure was due to the predominance of the nationalized sector in the economy (see chapter 4). In both countries a large number of subsidiaries of foreign enterprises were sizeable enough to be selected and this is the main reason for the small size of the large components. In Germany and the Netherlands, the banks were the main integrators of the network, though the German network was both denser and more centralized than the Dutch. Historically, the German banks have played an important role as industrial banks with large, direct financial participations in German industry (see chapter 5) and this contrasts with the Netherlands, where the banks were strongly oriented towards trade and, by consequence, towards the provision of short-term credits (see chapter 6). Although the large component of the Italian network was denser than that of the Netherlands, the Italian network was less centralized. This was due to the fact that it had two centres: a state and a private centre (as is shown in chapter 11). The British network had

the loosest network of all countries: a moderately sized large component with a low density and a low level of centralization. In chapter 12 several arguments are given for this sparse and less integrated network, two of which are the presence of other forums of business discussion and the high frequency of British board meetings in comparison with the practice in most other countries.

Although the value of H is independent of the density of a graph, it can be seen in table 2.4 that there was an almost perfect association between centralization and density over the ten countries: less dense networks tended to be less centralized. This association did not occur in Italy however, due to the very clear bipolar structure of the Italian network. The association can partly be explained by the fact that lines in a network of interlocking directorships are not created independently of one another. A new board position for a multiple director who already occupies ten positions creates ten new lines, unless a number of these corporations were already connected by one or more interlocks. Centralization and density are both strongly dependent on the accumulation of positions shown in table 2.1. This dependency will be eliminated in the third section, where only primary interlocks are considered.

Because of the special empirical meaning of distance 1 (direct access) and distance 2 (one or more meeting points), the relative centrality of corporations in the network can best be determined on the basis of their immediate neighbourhood.[4] Centrality measures based on all

Table 2.5 Distribution of lines over corporations in the large components

	Percentage of lines								*Number of lines carried by the most central corporation*[a]
	1	*2*	*3–5*	*6–10*	*11–25*	*26–50*	*51 or more*	*Total*	
Austria	10	7	20	17	33	12	0	100	47
Belgium	10	9	22	14	27	15	3	100	64
Switzerland	8	13	25	21	26	5	1	100	59
Germany	6	4	22	24	30	14	1	100	66
France	4	7	25	23	38	3	0	100	34
Britain	16	11	31	29	12	1	0	100	28
Italy	13	10	19	23	30	6	0	100	41
Netherlands	9	10	21	24	30	6	1	100	56
Finland	7	10	16	21	29	15	2	100	74
USA	5	7	16	37	30	4	0	100	37

Note:
a In graph theory the number of lines carried by a point is called adjacency or degree.

distances or on information flows over all shortest paths in a network (Freeman, 1979) do not seem applicable in this empirical situation, because distances larger than 2 have little meaning for communication or control between corporations. Table 2.5 gives the distribution of lines over the corporations in the ten large components. The number of lines with which a corporation is incident corresponds to the number of corporations to which it has direct access (distance 1). Table 2.5 shows how the differences in centralization and density in the large components of the ten countries resulted in quite large differences in the distribution of lines over corporations. In Finland the most central corporation was directly connected with no less than 74 other corporations through one or more interlocks, whereas in Britain the most central corporation was directly linked with only 28 other corporations. Another significant aspect of the distribution of lines over corporations is the fact that in some countries this distribution seems to have been double peaked. In Austria, Belgium and Finland, the three most centralized networks, corporations had either a very few or a rather large number of lines, a fact that of course results in a high degree variance for the component.

The existence of central corporations in a network, i.e. corporations that are directly connected with a large number of other corporations, is not identical to the existence of a *centre* in the network. Central corporations may well have their own spheres of influence, in which case one can hardly speak of one overall centre. The concept of a centre is, rather, associated with the existence of a number of central corporations having a high number of mutual connections: the network between central corporations is densely connected, and all central corporations are able to communicate with each other. As communication in the network of interlocking directorships is confined to distances 1 and 2, central corporations were seen as constituting one centre if they had either direct access or meeting points with *all* other central corporations. In other words, to determine whether central corporations constitute one centre, the maximal subset of central corporations, in which all pairs of central corporations had distances 2 or less in the graph as a whole, was investigated. Graph-analytically this is equivalent to ascertaining which points with the highest number of lines are contained in one or more 2-cliques in the overall graph (Alba, 1973; Mokken, 1977; Mokken and Stokman, 1979).[5] The sizes of these centres varied considerably: 58 corporations in Finland, 48 in Belgium, 38 in the Netherlands, 35 in Germany, 34 in Austria, 28 in Switzerland, 21 in Italy, 15 in France, 12 in the USA, and 9 in Britain.

For a further analysis of the degree of centralization in the network, the larger national centres were split into two groups – the *core* and

inner margin. A core consists of those corporations that are most important in terms of the diffusion of information between them within its centre; this is measured by the rush. The *rush* of a point is a measure of the probability that a unit of information between two randomly chosen points over the shortest paths passes through the

Table 2.6 Size and density of centrality groups

(a) Size of centrality groups[a]

	Centre			*Outer margin*	*Periphery*	*Total*
	Core		*Inner margin*			
Austria	11	—	23	85	28	147
Belgium	21	—	27	100	34	182
Switzerland	12	—	16	137	41	206
Germany	15	—	19	121	39	195
France	—	15	—	161	44	220
Britain	—	9	—	137	39	185
Italy	7	—	14	125	34	180
Netherlands	16	—	22	118	34	190
Finland	23	—	35	109	43	210
USA	—	12	—	167	47	226

(b) Density of centrality groups

	Centre			*Outer margin*	*Periphery*	*Total*
	Core		*Inner margin*			
Austria	0.84	—	0.33	0.05	0.02	0.08
Belgium	0.72	—	0.25	0.03	0.02	0.07
Switzerland	0.79	—	0.23	0.03	0.01	0.05
Germany	0.74	—	0.30	0.03	0.03	0.07
France	—	0.45	—	0.05	0.02	0.04
Britain	—	0.39	—	0.03	0.01	0.03
Italy	0.67	—	0.42	0.05	0.02	0.06
Netherlands	0.56	—	0.23	0.03	0.03	0.05
Finland	0.59	—	0.19	0.03	0.01	0.07
USA	—	0.35	—	0.03	0.01	0.04

Notes:

a In France, Britain and the USA the centres were too small for further division into core and inner margin.

— Throughout the book a dash has been used in the tables to indicate that an entry is not available or not applicable.

point in question (Anthonisse, 1971). In this case an overall centrality measure can be used because the centre contains no large distances.[6] The sets of non-central corporations were also split into two groups. The corporations with the highest sum distances are considered to belong to the *periphery* of the network, their rows in the distance matrix containing a quarter of the sum of all distances in the network. The other non-central corporations are termed the *outer margin*.

Table 2.6a gives the sizes of the different centrality groups in the ten countries, and the densities within these centrality groups are given in Table 2.6b. The relatively low densities of the British, French and American centres are very significant. Although these centres were about the same size as the cores in the other countries, their densities were much lower. In these three countries one can hardly speak of a true network centre, and for other reasons this was also the case in Italy (see chapter 11). In the other six countries, the network of interlocking directorships can be said to have been built around a densely connected centre of corporations. This is corroborated by the fact that the bipartite densities between core and inner margin were higher than the densities within the inner margin. If the bipartite densities between core and outer margin, between inner margin and outer margin and within the outer margin are compared, a decreasing order from the first to the third can be observed for all countries with a true centre.

The composition of the cores and centres will be considered in detail in the national chapters and will be compared in chapter 15. For the moment it can be concluded that six countries had a true centre, three countries had no centre and one country (Italy) had two centres. The six countries with a true centre had a more dense and more centralized network structure than the three countries without centres. The density of the Italian network, however, was similar to that of the six countries with a single centre.

TYPES OF INTERLOCKS AND STRENGTH OF LINES

In the preceeding section the total network of interlocking directorships has been studied. This discussion of the overall structure of the network did not distinguish between different types of interlocks. In general, interlocks were considered as indicators of the existence of communication channels between corporations, possibly to be used for the direct exchange of information between their highest levels of decision-making. This is only partly true, however. For certain interlocks this interpretation is too weak, while for others it might be too strong. It is well known that in certain situations interlocking directorships have a one-sided character, particularly if they coincide

with financial participations. Such interlocks indicate that the potential for financial *control* is being effected. In other situations, however, interlocks just result from the fact that two corporations have a common third orientation. An executive of a bank, for example, might be appointed as a director of two corporations, B and C, because of a common bank-orientation of the two corporations. These relations may be due to financial links between the bank and the corporations or just to a need to bring financial expertise into their boards, and it is doubtful whether the resulting interlock between B and C will be used for the direct exchange of information between them. Such interlocks are termed *induced interlocks*[7] because they are due to a common third orientation. Three variants can be distinguished.

First is the situation where corporation A has long-standing economic links, such as financial participations or relatively permanent supplier/buyer relations, with several other enterprises. Such relations can be termed *institutional* links, and the interlocks between corporation A and the other corporations can be considered as *primary interlocks*. If the personal interlocks which effect the institutional links between A and the other corporations are equally divided among A's directors, then only a few induced interlocks will result among the other corporations. If, on the other hand, only one or two individuals in A are specially qualified to carry the primary interlocks, a large number of induced interlocks will result. The number of induced interlocks grows rapidly with the number of positions held by a person.

Induced interlocks may also arise because several corporations have a common institutional orientation outside the selected corporate system, e.g. in the government.[8] In this second situation *all* interlocks between corporations should be considered as induced, as they are not created specifically in order to establish communication channels between the corporations. The number of these induced interlocks increases, as above, if only a few people are considered to be specially qualified to carry the primary links with the outside organizations. In the two situations discussed, the importance of induced interlocks for the network increases if institutional links, inside or outside the network, coincide with the special qualifications of the few people carrying the primary links. This leads to a consideration of a third situation that has to be distinguished, namely that the third orientation of the corporations is simply to the highly qualified person. In this situation the primary orientation is completely *personal*. Again, all interlocks between corporations should be seen as induced.

Due to a lack of information about institutional links among the selected corporations (only financial participations are known and only for some countries) an indirect method had to be used to deter-

mine the relevance of different types of interlocks as indicators of institutional links. For this purpose interlocks were classified according to the combination of positions of the multiple director in the two corporations. For a comparative analysis of the intercorporate structure on the basis of interlocking directorships, such a classification should be based on criteria that are independent of the different board systems. As stated in chapter 1 and earlier in this chapter, two functions have to be carried out at the top decision-making levels in large corporations: the supervising and the executive. The way in which these two functions are organized differs from country to country and depends on the legal structure of the corporation. The theoretical importance of the distinction between them makes it desirable to classify positions according to whether they are primarily executive or supervisory. Involvement in all major decisions within a corporation on a day-to-day basis was taken as the determining characteristic of *inside positions*. These positions are usually held by persons who are employed full time by the corporation. In the German system all positions on the executive board were considered to be inside positions and in the Anglo-American system the executive directors were considered as insiders. In the Anglo-American system the distinction between executive and non-executive directors is a clear-cut distinction and all non-executive directors were defined as holding *outside positions* in the corporation. In the continental European systems, however, further distinctions can be made. In the Latin system, positions on the first board that were usually occupied by full-time directors were classified as inside positions. A number of members of the first board, along with members of governing boards of co-operatives, and the chairmen and delegated directors of the supervisory board in the German system were designated as holders of *intermediate positions*. This designation was made on the basis of their involvement in major decisions on a more regular basis than the true outside directors. These definitions are further specified in the various national chapters. In certain analyses the intermediate positions were considered as a separate category, but in all other cases they were counted with the outside positions as they did not correspond to the strict criterion of day-to-day involvement in major decisions.

In the first part of table 2.7 the percentages of inside, intermediate and outside positions in the ten countries are given. It shows that in the Latin variant of the continental European board system the number of inside positions was considerably smaller than in the other board systems. This difference disappears, however, if only those positions that are held by multiple directors are considered. No systematic differences between the various board systems can be observed any longer, although important differences between countries (such as the

Table 2.7 Inside, intermediate and outside positions

	All directors (%)				*Multiple directors (%)*			
	Inside	*Inter-mediate*	*Outside*	*Total*	*Inside*	*Inter mediate*	*Outside*	*Total*
Austria	37	5	58	100 (2,939)	27	9	63	100 (780)
Belgium	18	10	71	100 (3,000)	21	13	66	100 (1,170)
Switzerland	39	11	50	100 (3,681)	38	34	28	100 (1,087)
Germany	39	5	56	100 (4,727)	20	10	70	100 (1,204)
France	13	8	79	100 (2,625)	14	8	77	100 (1,072)
Britain	—	0	—	100 (3,091)	26	0	74	100 (691)
Italy	25	0	75	100 (2,358)	26	0	74	100 (972)
Netherlands	31	15	54	100 (2,950)	16	12	72	100 (984)
Finland	11	26	62	100 (4,178)	15	21	64	100 (1,632)
USA	29	0	71	100 (3,976)	17	0	83	100 (1,432)

Note: Absolute numbers are in parentheses.

very high percentage of inside positions for multiple directors in Switzerland) can be observed. The larger number of executive positions found in the German board system and in the USA was related principally to the internal management of the corporation and was not associated with representation of the firm on third-party boards.

Figure 2.3 Types of interlocks

Position in corporation A \ Position in corporation B	Inside	Intermediate	Outside
Inside	ININ interlocks	INMED interlocks	INOUT interlocks
Intermediate		MEDMED interlocks	MEDOUT interlocks
Outside			OUTOUT interlocks

On the basis of all possible combinations of types of positions held by a multiple director in two corporations, interlocks can be classified into the six types shown in figure 2.3. This typology is based on the assumption that different types of interlocks correspond with the exchange of differing amounts of information. If one multiple director has an inside position in two corporations, then the two corporations

are very strongly tied together. In such rare cases the interlock is clearly used to exercise control. At the other extreme, an interlock created by a multiple director who has outside positions in two corporations can be assumed to involve only communicative functions, unless such an interlock coincides with other interlocks to create a line of high multiplicity. *The more 'outside' the combination of positions, the looser the interlock can be assumed to be.* This is confirmed if the types of interlocks that are used in combination with financial participations are considered. For eight countries data on financial participations were available and table 2.8 gives an overview of the types of interlocks that co-occur with them. This analysis suggests that INOUT interlocks, either alone or in combination with others were used to effect the possibilities of control created by financial participations. Finland and Belgium deviate from the other countries in terms of both the low percentage of financial participations without interlocks and the lower frequency of use of INOUT interlocks to effect them. Particularly in Belgium, multiple interlocks were an alternative mechanism for effecting intensive and mutual control relationships by the holding companies and their associated corporations. In other countries one of the executives of a parent tended to be an outside director in its subsidiary, whereas in Belgium and Finland the reverse was quite often the case. In these latter networks, therefore, it is dangerous to assign a direction to the INOUT interlock, although this might well be done for other countries. In all networks, however, INOUT interlocks were clearly tighter than MEDMED interlocks. It was, therefore, decided to consider ININ, INMED, and INOUT interlocks as *primary* interlocks and the other types of interlocks as *secondary*.

These results confirm that the combination of positions in two corporations is related to the strength of the relation between them, as was assumed in earlier studies on the basis of the following theoretical arguments.

(1) A corporation is likely to use an insider to effect its institutional links.
(2) A corporation is not likely to allow its executives to spend a great amount of time on other boards unless such positions serve certain institutional links.
(3) An executive of a corporation in a supervisory position in another corporation has the right to receive all relevant financial information about that corporation, whereas the corporation has no such right of access to information about the base company.

If primary interlocks can be associated in general with institutional

Table 2.8 Co-occurence of types of interlocks with financial participations

	Interlocks/participation co-occurences (%)										
	Single types of interlocks						Combination of types of interlocks[a]				
	ININ	INMED	INOUT	MEDMED	MEDOUT	OUTOUT	INOUT and one another	Other combinations of 2	Combinations of at least 3	Total	Financial participations without interlocks as percentage of all financial participations
Austria	4	10	27	0	3	4	37	4	11	100 (73)	27
Belgium	2	4	16	0	7	5	20	14	33	100 (220)	17
Switzerland	0	0	27	0	4	4	27	15	23	100 (26)	41
Germany	1	9	39	0	4	8	29	5	5	100 (98)	24
Britain	0	—	65	—	—	12	23	0	0	100 (26)	54
Italy	1	—	38	—	—	20	29	6	6	100 (93)	46
Netherlands	0	6	57	2	0	4	23	2	4	100 (47)	45
Finland	5	7	22	2	6	11	23	10	15	100 (155)	25

Notes: Absolute numbers are in parentheses.
a The combinations in this table refer to the number of types and not to the multiplicity of interlocks.

links, as the above results strongly support, it makes sense to consider two types of secondary interlocks in further analyses. If a person is an executive in corporation A and an outside director in corporations B, C, etc., it will be clear that all his or her interlocks between A and the other corporations are primary interlocks. All the interlocks of that person between the corporations B, C, etc., will be classified as *induced* by his primary interlocks. All the remaining interlocks, i.e. all interlocks created by persons who are not executives in any corporation, are considered to be induced by common institutional orientations outside the selected corporations or to be due to personal qualifications only. These interlocks are, for the moment, designated as 'unclassified'. In table 2.9 the distribution of these types of interlocks are given for all ten countries, and the primary and induced interlocks are further subdivided according to whether the main affiliation of the multiple director was located in a financial corporation (including the Belgian holdings), in a production corporation, or in both. Only in Austria and in countries with the Latin board system was this last combination of executive positions frequent enough to give measurable values. Table 2.9 shows that the distribution of these types of interlocks was quite different for the ten countries. Moreover, it shows that the unclassified interlocks contribute significantly to the density of the networks. In Switzerland, the USA, the Netherlands, and France more than 50 per cent of all interlocks were carried by persons who had no executive positions in any of the selected corporations. In several of the following chapters a number of these unclassified interlocks are classified on the basis of biographies of individuals.

Table 2.2 showed that, in general, a small number of big linkers – directors with four or more directorships – were responsible for a very large number of interlocks. In particular, a small number of multiple directors with four or more directorships, but without any inside positions, carried most of the unclassified interlocks:

156 interlocks by 11 network specialists in Austria;
270 interlocks by 28 network specialists in Belgium;
514 interlocks by 31 network specialists in Switzerland;
378 interlocks by 32 network specialists in Germany;
378 interlocks by 42 network specialists in France;
37 interlocks by 4 network specialists in Great Britain;
272 interlocks by 16 network specialists in Italy;
380 interlocks by 34 network specialists in the Netherlands;
423 interlocks by 41 network specialists in Finland; and
307 interlocks by 39 network specialists in the USA.

These multiple directors will be denoted *network specialists*, by virtue of their important role in communication through the intercorporate network as a whole. They are the opinion leaders in business and their positions in many different corporations can provide them with information from many different sources. Often playing the role of the *eminence grise*, their prestige in business circles is such that they may well represent large sections of the business world. Their function is, then, to 'supply some order and co-ordination in place of anarchy' (Barratt Brown, 1973, p. 103). This, of course, does not hold for all big linkers. A big linker may hold these positions because of membership in a minority ethnic group or because of his or her gender. Increased concern over equal opportunities might be expected to result in greater numbers of such people. This distinction between those big linkers who are and those who are not network specialists must be drawn in each case on the basis of detailed biographical information.

Those big linkers who hold an inside position in one corporation tend to be more than simply representatives of their base company and take on the communication role attributed to network specialists. This idea were expressed long ago by C. Wright Mills, when he argued that:

> On the higher levels, those in command of great corporations must be able to broaden their views in order to become industrial spokesmen rather than merely head of one of the greater firms of industry.
>
> In short, they must be able to move from one company's policy and interests to those of industry. There is one more step which some of them take: they move from the industrial point of interest and outlook to the interests and outlook of the class of all big corporate property as a whole. (Mills, 1956, p. 121)

The concept of big linkers is an empirical elaboration of the idea that 'on the higher levels' industrial spokesmen are more than just the heads of the large firms. Since the big linkers carry a disproportionate part of the network it may be assumed that the network as a whole is more important for communication than for domination and control. From an individual corporation's point of view this function has been called 'environmental scanning' (Useem, 1982) but from the point of view of the corporate *system* this concept stresses the passive side of the big linker's function. The industrial spokesmen constitute the inner circle of the corporate directorate and historical research has demonstrated that the big linkers are decisive in promoting new ideas on political and economic issues, new answers to urgent problems and ways out of economic problems which confront several, if not all, corporations (Baudet and Fennema, 1983).

Table 2.9 Distribution of types of interlocks (%)

	Financial		*Production*		*Financial and production*		*Unclassified*	*Total number of inter-locks*
	Primary	*Induced*	*Primary*	*Induced*	*Primary*	*Induced*		
Austria	15	27	10	8	8	8	23	100 (1,238)
Belgium	10	13	13	15	13	11	25	100 (2,049)
Switzerland	8	8	13	8	0	0	63	100 (1,314)
Germany	13	20	15	14	0	0	38	100 (1,629)
France	7	11	15	12	3	3	50	100 (1,326)
Britain	23	13	25	12	0	0	28	100 (591)
Italy	7	8	18	13	14	8	32	100 (1,380)
Netherlands	10	13	14	9	0	0	53	100 (1,173)
Finland	5	7	22	18	5	4	38	100 (2,248)
USA	6	4	23	12	0	0	55	100 (1,308)

Note: Absolute numbers are in parentheses.

The next section analyses that part of the network than can most directly be connected with institutional links: the networks of primary interlocks. Although *multiple* unclassified interlocks between corporations are sometimes used as an alternative instrument to maintain institutional links, as table 2.8 showed and further analyses in the national chapters will demonstrate, they will not be considered in the analysis of the overall structures in the following section.

STRUCTURAL FEATURES OF THE NETWORK OF PRIMARY INTERLOCKS

What are the consequences of the elimination of secondary interlocks for the network structures in the ten countries? This question can be approached by considering again the two major structural concepts of density and centralization, referring to the chapters on individual countries for further details and for discussions of clustering. In table 2.10 density and centralization in the network of primary interlocks are given for the ten countries, as they were given in table 2.4 for all lines. It should be stressed that the results are based on analyses in which no direction from inside to outside positions has been attached to primary interlocks. While this may be done in some of the separate national analyses, it is not done in this comparative analysis because of the particular features of the Belgian and Finnish networks reported in the previous section.

The structures of the networks of primary interlocks did not deviate significantly from the structures of the overall networks. The three countries without an overall centre, Great Britain, the USA and France, were again found to be the least centralized networks, as their low values for the H-index of graph heterogeneity indicate. These three countries were followed by Italy with its two centres in the overall network. Of the six countries with an overall centre, Belgium had by far the most dense and centralized structure in its network of primary interlocks. The correlation between centralization and density in the networks of primary interlocks is no longer an artefact of dependency on the number of lines, as was the case in the networks of all interlocks. Each line is, in principle, created independently from any other by each new position taken by an inside director. This implies that the correlation should be seen as an important empirical finding. Inspection of table 2.10 shows that the correlation is disturbed in three countries: Italy had a dense network with a low centralization, whereas Germany and the Netherlands had a centralized network of primary interlocks with a low density. While the first can be attributed to the two centres in Italy, the latter finding is due to the very central position

Table 2.10 Components in the networks of primary interlocks

	Number of coporations					*Density (largest component)*	*H index (largest component)*
	Selected	*Isolated*	*In small components*[a]	*In medium-sized components*[a]	*In largest component*		
Austria	241	108	7	0	126	0.038	0.20
Belgium	270	109	12	12	137	0.054	0.30
Switzerland	250	87	7	5	151	0.022	0.16
Germany	259	79	6	0	174	0.027	0.21
France	250	69	13	0	168	0.020	0.06
Britain	250	84	10	0	156	0.021	0.07
Italy	247	88	0	4	155	0.036	0.11
Netherlands	250	100	9	0	141	0.026	0.21
Finland	237	46	4	0	187	0.035	0.19
USA	252	49	13	0	190	0.019	0.05

Note:

a Small components refer to components of size 2 or 3 as in table 2.4. Medium-sized components refer to all other components except the largest one; their sizes vary between 4 and 8.

in each network of a few banks that rely heavily on the interlocks of their own executives, as will be demonstrated in chapters 5 and 6.

It can, therefore, be concluded that the contours of an overall national network were determined by the pattern of its primary interlocks, even though these interlocks generally constituted far less than half of all interlocks. Even if the remaining interlocks can be interpreted in terms of general business communication, they can be seen to correspond to the institutional preferences and constraints on the basis of which the primary interlocks were established. The primary interlocks can, therefore, be interpreted as the skeleton around which the body of a network is formed and which thus determines its shape. In the following chapters, the shapes of the 'skeletons' and 'bodies' will be analysed in far more detail than was possible in this comparative chapter.

In this chapter it was demonstrated that the network structures and board systems in the ten countries were strongly associated. For this reason, the national chapters have been ordered according to board system. First the four countries with a German board system will be analysed: Austria, Germany, the Netherlands and Switzerland. Next the four countries with the Latin board system will be considered in more detail: Belgium, Finland, France and Italy. Finally, the two countries with the Anglo-American board system will be examined: Britain and the USA. First, however, interlocks will be related to the economic performance of corporations in the next chapter. Because of the association between board system and network structure, three countries that represent three different board systems have been selected for this analysis: Belgium, the Netherlands and the USA. Readers who are not acquainted with the techniques of chapter 3, may go straight to chapter 4 and the other national chapters as the analyses in those chapters are not dependent on those of chapter 3.

NOTES

1 The general formula is $m(m-1)/2$, where m is the number of positions held.

2 In an undirected graph with N points, the potential number of lines is the total number of pairs of points, which equals $N(N-1)/2$. At several places in the book the density between disjoint (i.e. exclusive) subsets of corporations, such as financials and non-financials, are considered. In these situations, analysis is confined to pairs of points in which one point belongs to the first subset and the other to the second subset. In such a 'bi-partite graph', with N_1 points in the first subset and N_2 points in the second, the total number of pairs is $N_1 * N_2$ (Harary et al., 1965; Harary, 1972).

3 An undirected graph is 'connected' if all its points are directly or indirectly linked with one another through sequences of lines. A 'component' in a graph is defined

as a maximally connected subgraph. In a directed graph, a point is 'reachable' from another point if it is possible to move from the latter to the former through a continuous sequence of lines running in the same direction. A 'weak component' is a maximally connected subgraph in which no direction is given to the lines. A 'strong component' is a maximal subgraph of mutually reachable points.

4 In an undirected graph, two points are 'adjacent' to one another if they are directly connected by a line. The adjacency of a point is defined as the total number of its adjacent points. The 'degree' of a point is defined as the total number of lines that are incident with the point. In a simple graph without loops and parallel lines, the adjacency and the degree are equal. In a directed graph, the 'indegree' of a point is the total number of its incoming lines and the 'outdegree' is the total number of its outgoing lines.

5 In graph theory the general definition of an *N*-clique is a maximal subgraph in which each pair of points has a maximum distance of *N* to one another in the graph as a whole. In a 1-clique, all pairs of points are directly connected by lines.

6 The split between core and inner margin is chosen where a break is observed in the values of the rush.

7 Sweezy (1939) combines these with certain other types of interlocks and terms them secondary interlocks.

8 It should be noted that any study which selects a subset of corporations for investigation, e.g. the top 250, is likely to involve cases where interlocks between selected corporations arise from common institutional links to a company outside the top 250. The technical problems raised by this possibility are discussed at the relevant points in the following chapters.