The internal organisation of the Australian corporate elite: A 'small world' analysis

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Abstract
This paper examines the network of personal contacts, created by interlocking directorates, among all board members of the Top 500 publicly listed Australian companies. In the past it has been difficult to analyse such sparse networks, however recent advances in our understanding of the 'small world' phenomenon and the application of random graph theory to large networks provide new tools to measure the connectivity of large networks of this type. The paper analyses the 'small world' of Australian company directors in 1976 and 1996. We find that the size of the network increases significantly from 1976 to 1996 and that its connectivity increases also. We examine the most central persons in the network. We find that network centrality differs markedly when measured by average distance rather than degree (i.e. direct contacts) and we examine the network profiles of persons who rank highly on the different scores.

Introduction: Corporate elite studies, inter-corporate networks and the network of personal contacts among company directors

It is commonly accepted that ‘business’ has an influential ‘voice’ in national economic and political affairs. Indeed it is possible to argue that business attitudes and perspectives also exert a subtle but pervasive hegemonic influence on much of our social and cultural life. There is less theoretical agreement if we attempt to theorise about the internal organisation of business or to locate centers of consensus building and decision-making within the business community. On the one side structuralist theories tend to discount any overt forms of agency in the business community referring instead to its embedded, structural power. Other approaches, however, acknowledge some element of overt agency and internal organisation for business. The locus of this internal organisation may be postulated to lie within the major institutions of business, the major companies, banks and investment agencies. Classic power elite theory locates it within the professional training and career structures of the corporate elite personnel themselves. More recently attention has focused on the activities of employer ‘peak organisations’ such as the Business Council of Australia.

1 The ideas for this paper were developed in collaboration with colleagues in the Social Networks Research Group at the Netherlands Institute for Advanced Study (NIAS), 2000-2000. The other members of the research group were William Carroll, Meindert Fennema, Eelke Heemskerk and Robert Mokken. Further significant input came from Prof. Geoff Kiel and Gavin Nicholson, colleagues in the Corporate Governance research group at the University of Queensland. Much of the data for the study was collected under ARC Large Grant, File No: A79905918.
Australian sociologists and political scientists have studied business from this range of perspectives. Sol Encel provided a good account of the power elite of the 1960s (Encel 1970). In the 1970s Bob Connell provided a more sophisticated theory that stressed the closeness of political and big business leaderships but also gave a prominent role to the media using Gramscian notions of organic intellectuals and hegemony (Connell 1977). Higley and others (1979) carried out an extensive survey of Australian elites in 1974 but their theoretical defence of elites troubled Australian audiences and there was virtually no further work of this kind. At the end of the 1980s McEachern (1991) described the inner circles of business leaders who were influential in the Hawke years. An account of media glorification of business leaders in the 1990s that continues the Gramscian aspects of Connell’s approach is contained in Graeme Turner’s book, Making it National (Turner 1994). However there has been little Australian work in the power elite tradition of C.W. Mills and William Domhoff.

A general sympathy with structuralist approaches in sociology in this country means that analyses of business power in Australia emphasise the size and power of the large corporations more than the internal organisation and agency of the business elite. This tendency toward structuralist theory has important implications for the conceptualisation and handling of information about corporate elites and interlocking directorships. From the structuralist perspective, research studies of company managers and directors look at multiple directorship holders just as ‘interlockers’; people who create linkages between corporations. Seen primarily as ‘bearers’ of these structural relations, analysis of personal attributes or personal relations is a secondary exercise. The analysis of interlocking is, in the first instance, simply about networks among corporations, or groups of corporations (see for example Carroll and Alexander 1999).

However, elite studies of business leaders and network studies of interlocking directorates begin from the same information base; lists of the directors and managers of major corporations. Both sets of researchers select a population of large companies and then make a census of all persons on the boards of these companies. That they analyse this information in different ways creates an impression of distinct research traditions. On the one side, elite studies focus on the population of persons, what is the average age and gender, what is their background, what are the principal clubs or associations to which they belong etc.? Network studies of interlocking directorates disregard most of this personal information. They shift the material to find those directors who have two or more positions. They then reconstitute this basic information as a set of linkages, a network, between the companies of the original selection set. Corporate power structure research and network based studies do, however, allow for an intermediate form of elite study. High levels of multiple directorship holding, i.e. personal participation in the inter-corporate network, are taken to measure a person’s centrality. The population of ‘big linkers’ (persons with four or more directorships) or ‘network specialists’ is then studied with traditional survey and interview techniques (Useem 1984).

A consequence of this methodological division of labour is that the expertise of social network analysis is almost never applied to study the network of contacts among company directors that arises from boardrooms as meeting places. This paper seeks to fill this gap in the research literature. There are, however, practical and theoretical reasons for the division of labour described above. The practical reasons relate to the difficulty of dealing with the very large networks of individuals that these datasets entail. There are, typically, some 2,500 or 3,000 persons in the datasets and it is only recent advances in microcomputer capabilities that permit analysis of such large networks. The theoretical difficulties come from the conceptual differences between studying small, relatively complete networks, the principal terrain of social network analysis, and the large, sparse networks typical of interlocking directorate data. The computing difficulties need no further comment however the theoretical sections of this paper deal with the theoretical and conceptual issues.
The small world of company directors: Network connectivity and structure

The networks of personal contacts among company directors generated by board memberships are very sparse. Traditional social network analysis has developed mostly in small group settings. The directors’ networks of personal contact are so sparse that the techniques and theory of social network analysis have little immediate application to these networks. Thus, for instance, most social network theorists see relative density, the number of ties made between persons as a proportion of all possible ties, as a fundamental feature of networks. In the case of directorship networks this measure is very small, usually only a fraction of one percent. With indicators of such extreme values, insights from traditional social network analysis seem to have little relevance to these directorship networks.

Recent discussions in network analysis have opened new approaches to the conceptualisation and measurement of large, sparse networks. These discussions arose partly from the need to study very large networks such as the internet. Other innovations were stimulated by graph theory, the mathematical basis of network analysis, particularly advances in the theory of random graphs. Another impetus has been a renewed interest in understanding the dynamics of the ‘small world phenomena’.

The impact of this new thinking is to shift the conceptual idea of networks away from a concern with density towards a concern with connectivity. Connectivity is an attribute of the whole network. It reflects its sparseness or density, the basic concept of social network analysis. However, whereas the traditional concept of density sets as its benchmark the situation where every person in the population is directly connected to every other person in that population, connectivity simply requires that every person have some point of connection to the network. Network connectivity and density are only loosely related. They converge only at the extremes. The maximally dense network where all persons are directly connected to every other person is, of course, fully connected. At the other extreme there are only two possible forms of the minimally dense, fully connected network. In between these extremes however connectivity and density can come in many combinations.

Its two minimal forms, the tree and the star illustrate the idea of connectivity. Any population (of size N) requires a minimum of N-1 ties to connect all its members. The connections can be made in two configurations.

Network Example 1.  
4 Points, Star Configuration

Network Example 2.  
4 Points, Tree Configuration

Both these populations are fully connected. Every point is drawn into the network. They achieve full connectivity with only three lines (N-1) compared to the six lines (N(N-1)/2) that are possible among four points. Thus we have connectivity although these are not dense networks.
Connectivity is an attribute of the network itself. It has not an attribute of the points. In order to measure the impact of connectivity at the level of the point (the person) we use the idea of average geodesic distance. The geodesic distance between any two points in a network is the shortest number of steps needed to get from one point to another. For each point we count the number of steps between it and every other point. We then average this total by the number of points reached from that point. This provides the average geodesic distance for that point. The average distance for the network is the average of these point averages. Calculations of average distance for Examples 1 and 2 are given in Table One.

<table>
<thead>
<tr>
<th>Network Example 1: Star Configuration</th>
<th>Example 2: Tree Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>A B C D Sum Average</td>
<td>A B C D Average</td>
</tr>
<tr>
<td>A 0 2 2 1 5 1.66</td>
<td>0 1 2 3 2.0</td>
</tr>
<tr>
<td>B 2 0 2 1 5 1.66</td>
<td>1 0 1 2 1.33</td>
</tr>
<tr>
<td>C 2 2 0 1 5 1.66</td>
<td>2 1 0 1 1.33</td>
</tr>
<tr>
<td>D 1 1 1 0 3 1.0</td>
<td>3 2 1 0 2.0</td>
</tr>
<tr>
<td>Total 18 1.5</td>
<td>18.6 1.66</td>
</tr>
</tbody>
</table>

The tree and the star also illustrate a key point about network structure, its degree of centralization. Although both networks have the same number of points and lines, the star is more centralised structure. In the star configuration no point is more than two steps away from any other point. In the tree configuration, by contrast, the points at the end of the tree are two steps away from each other. At the network level the centralization created by the presence of a star decreases the average distance in the network. The star configuration has an average distance of 1.5, somewhat less than the average distance of the tree configuration which is 1.66.

The importance of the most central point to the network has made it a standard for the measurement and concept of centrality. The distance of any other point from the most central point has become a de facto measure of that (other) point’s centrality. All points with a connection to the central point are parts of a single network (or component) and hence able to connected to one another. The most central point is then a marker for the whole network. Mathematicians maintain a list of collaborative authorships generated from the prolific co-authorships of the Hungarian mathematician, Paul Erdos. They thus assign each author in the component an ‘Erdos number’. Movie buffs play a similar game by seeking to find the shortest distance, tracked through co-appearances, of any actor to Kevin Bacon, the most central person in the lists of movie co-appearances.

A concern with the connectivity of networks, rather than density, allows us to integrate important insights from two other areas of theoretical discussion and mathematical inquiry; random graph theory and discussion of the ‘small world’ phenomena.

Random graph theory takes the number of lines (or connections) in a network, as compared to the number of points (or people), as the key ratio when thinking about connectivity. Random graph theory provides important insights into the random probabilities of connectivity in a network for a given ratio of lines and points. It investigates the patterns of connectivity that can be expected as more lines are added to a network with a given number of points. Random graph theory studies the behavior of networks as they grow and evolve over time. It is used to model various real-world networks, such as social networks, the internet, and biological networks. Random graph theory provides insights into the existence of giant components, clustering coefficients, and the small-world property, among other phenomena.

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2 The list is maintained by Jerry Grossman at the website www.oakland.edu/~grossman/erdoshp.html. The site has further explanation of the principles behind the list and the procedures for its maintenance.
theory predicts that increases in connectivity are not simple incremental. There are distinct, although approximate, thresholds. As the number of lines passes half the number of points, a random distribution of these lines will tend toward the creation of one central, large component and a number of isolates\(^3\). Random graph theory thus provides a way of comparing patterns of connectivity found in real life networks to patterns that can be expected to arise randomly. Thus, for example, nearly all studies of interlocking directorships find inter-corporate networks built around one single large component (Stokman, Ziegler et al. 1985). Random graph theory suggests that this is the expected pattern given that the number of lines generated by interlocking directorates is usually more than half of the number of corporations selected.

The discussion of networks and the ‘small world phenomena’ comes from sociological and experimental studies. The classic statement of this phenomena was made by Stanley Milgram in the 1960s (Milgram 1967). He suggested that chains of acquaintanceship would allow a message to reach a particular person through a chain of intermediary steps. He tested this idea by asking a population of randomly selected persons to forward a message to someone who might know the target person of the message. A significant number of messages reached their targets and Milgram calculated that the average number of intermediaries used was around about 6.

The idea that there are just six intermediate steps between any two persons chosen at random from the U.S. population has caught the public imagination through the phrase ‘six degrees of separation’. The phrase was popularised by a Broadway play, now a movie, by John Guare. The basic principles of the small world theory have been further popularised by the movie buffs’ game ‘six degrees of separation of Kevin Bacon’ mentioned earlier. In a short article in *Nature* Steven Strogatz, a professor of theoretical applied mechanics and Duncan Watts proposed a mathematical model that explained how the combination of densely connected groups with just a few connecting links can produce a wide network of connections. A more elaborate account of the model is available in Watts (1999).

These popular ideas link the concepts of connectivity (being in the network) and distance (the number of steps between two points). They reduce an immensely complicated and vast structure to a simple and tangible piece of personal experience. What they fail to publicise is the actual chances of making linkages. If one considers that each step in the chain of connections involves one choice out of a large number of possibilities, say 100, then the a successful connection at six degrees of separation is one path out of a possible one trillion paths. From this perspective six degrees of separation is a long, long social distance. Studies of acquaintanceship usually regard links of distance two, ‘friends of friends’, as the practical limit of individuals reachable network. This makes intuitive sense. We can see how this limitation operates in the case of the star and the tree illustrated earlier. While everyone in the star configuration is a friend of a friend (albeit the same friend), the persons on the ends of the tree formation are not friends of a friend.

Is it possible to give an absolute meaning to these measures of distance? We can take six degrees of separation as an outer limit, the average distance we can expect to find among the general population. At the other extreme the average distance within the star configuration represents the minimum distance for connectivity. Although small networks can connect at average distance less than two, as in the two examples, the average distance approximates to 2 for any relatively large network\(^4\). In absolute terms, therefore, average distance varies between 2 and 6. However, due to the multiplier effects noted above this is a geometric scale, akin to the Richter scale.

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\(^3\) This account of random graph theory derives from working papers presented by Robert Mokken to the Social Networks Research Group, Netherlands Institute of Advanced Study (NIAS), during the academic year, 2000-2001.

\(^4\) A network with 100 points will have an average distance of 1.98 in the star configuration.
The small world theory and the debate and ideas it has generated give social substance to the network concepts of connectivity and distance outlined earlier. The possibility of making a connection to any other person in the world through six or so intermediaries is intriguing despite the extreme probabilities involved. The popular conception does highlight the importance of distance as a measure of network connectivity however. Furthermore it is a useful measure both at the network level and the level of the individual. Each person in a connected network can reach any other person in that network. Thus each person has an average distance score. The average distance for the whole network is the average of these average distances.

The importance of connections at distance two, friends of friends, suggests a further measure of a person’s connectivity. In settings where we know, or can estimate, the total number of people in a network, the proportion of people falling within the distance 2 of an actor (their acquaintanceship network) indicates the scope and reach of that person’s network.

In summary, the small world of company directors can be understood as the network of personal connections created by direct acquaintanceships in boardrooms facilitated by the potential contacts (‘friends of friends’) available through board interlocks. The basic measures of connectivity in this acquaintanceship network are the average distance between persons, both at the point and network level, and the proportion of persons falling within distance two of a member of the network.

Small Worlds: Australian company directors 1976 and 1996

In this section we report findings from a comparison of the personal networks, created by board memberships, among the directors of Australia’s top 250 companies in 1976 and 1996. The population for analysis was initially taken as the directors of all 250 companies. When we analyse the connections among them, however, the population in the network reduces to those persons sitting on a board with a director who interlocks with another board in the main component of the network. The effective population of the small world comparison is, thus, a sub-population of the initial population. We present information about the small world of connections among this sub-population. We count the number of direct and second degree (‘friends of friends’) contacts of each person and the average distance between a person and any other person in the network.

In summary, the changes between 1976 and 1996 show that the small world of Australian company directors has become more inclusive, there are a greater number of people drawn into the network in 1996 as compared with the earlier year. Despite the increase in population the ‘small world’ of 1996 is even ‘smaller’ (ie more connected) than that of 1976 when viewed from the perspective of an individual participant. The average distance between people is less and the number of contacts at distance one and two increases both absolutely and as a proportion of the total contacts available in the network.

The population of companies for each year comprises the top 200 non-financial companies, determined by revenue and the top 50 financial companies, determined by assets. These populations were identified using the criteria used in international studies of the 1970s (Stokman, Ziegler et al. 1985). Information for the companies of 1996 was taken from the annual listing of the Top 1,000 Corporates made by Business Review Weekly. This list covers privately held companies, (including subsidiaries of foreign companies), cooperatives and government-owned enterprises as well as the publicly listed companies for whom information is

5 The Australian data were gathered as part of the joint work of the NIAS Research Group.
freely available through stock exchange sources. The initial population of companies for 1976 covered the same range of companies identified from a variety of sources including stock exchange yearbooks, (particularly Jobsons Yearbooks), and a range of business directories.

The directors of companies were identified from annual reports and business directories. The principal source of information for 1996 was the *Business Who’s Who of Australia*, now compiled and published by Dunn and Bradstreet. The principal source of directors’ information for 1976 was Jobsons Yearbook and, for unlisted companies, the *Key Business Directory*, also published by Dunn and Bradstreet. Additional reference was made to the *Kompass* business directory of that year. For both samples the names of all directors were cross-checked and any identical names were investigated more closely to confirm whether or not it was the same person sitting on two or more boards.

The lists of positions were read into the social network analysis program, UCINET (Borgatti, Everett et al. 1999). The affiliations command produced the matrix of connections between persons. The distance command then calculated the shortest distance (the geodesic) between all persons of the initial population. The total number of persons that any individual connects to is the size of the component they are in so that all persons in the main component had the same number of total connections. This sub-population of persons in the main component was then analysed for average distance and number of contacts.

The first finding was that the sub-population of persons included in the main component was substantially bigger in 1996 than in 1976. The main component of connections is, effectively, the network. Everyone in the main component is, potentially, reachable by anyone else in that component. In 1976 this network covered a population of 982 directors. In 1996 it covered a population of 1162 directors, an increase of 18.3%.

If there are more people to be connected, one might assume that it is harder to make links between them and, as a consequence, the ‘small world’ or each participant, their connectedness to other persons in the network would be less. That is to say, the average distance between persons would increase. In fact, we find a decrease in this measure. The average distance between persons in 1976 was 4.78 steps. In 1996 this has decreased to 4.34 steps. This is a decrease of 9.3%. The small world phenomenon is stronger although the population it covers is larger.

A similar finding applies to the scope of participants’ contacts. On average participants in the network in 1976 had 9.76 direct contacts. In 1996 the average number of direct contacts increases to 10.31, an increase of 5.6%. The greatest change occurs however in the number of indirect contacts for the average participant. In 1976 the average number of combined direct and second degree contacts was 50.85. This represents 5.18% of the 982 persons in the network. In 1996 the average number of direct and second degree contacts was 63.34, an increase of 24.6%. This represented 5.45% of the 1162 persons in the network.

As discussed earlier, the most central point (person) in a network is the point of reference for calculating the centrality of other points in the network. Thus Paul Erdos was the center of the mathematicians network and other people in the network measure their centrality in terms of their Erdos number. Kevin Bacon has this place of honor in the listing of movie co-appearances. The most central point of a network is, conventionally, defined as the point with the highest degree. In an interpersonal network this is the person with the highest number of direct contacts.

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6 This procedure also deals with the multiple memberships between two (or more persons). If two people share positions on two boards the affiliation matrix will retain this information, ie it is a valued matrix. When the geodesic is calculated it will be recorded as 1 from both boards so the redundancy will be eliminated.
In this paper we have focused on geodesic distance rather than degree as the network characteristic of most interest. We have also given emphasis to the importance of second degree contacts (friends of friends) as a basis of connectivity in the network. At first sight it would appear that both these measures would be closely correlated with degree. That is to say we would expect that persons with a large number of direct contacts would also have large numbers of indirect contacts and, hence, have short average distances to all members of the network. Thus the most central people in the network should be much the same on all measures. We can test this assumption by comparing the most central people in the network on each criterion.

Table Two presents the most central persons in the 1976 network ranked by degree, as in conventional analysis, and then by average distance. We also give the raw scores for degree, average distance, the number of direct and second degree contacts i.e. the two neighborhood (2N), and the value of 2N as a percentage of all persons in the network. Table Three provides the same information for the 1996 network.

**Table Two: Five Most Central Persons, 1976; when ranked by highest degree and when ranked by shortest average distance.**

<table>
<thead>
<tr>
<th>Person ID</th>
<th>Rank by Degree</th>
<th>Degree</th>
<th>Rank by Av. Distance</th>
<th>Average Distance</th>
<th>2N = Two Neighborhood</th>
<th>2N as % of Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Law-Smith, Richard</td>
<td>1</td>
<td>63</td>
<td>1</td>
<td>3.06</td>
<td>285</td>
<td>29.0</td>
</tr>
<tr>
<td>Niall, Gerald</td>
<td>2</td>
<td>51</td>
<td>3</td>
<td>3.12</td>
<td>266</td>
<td>27.9</td>
</tr>
<tr>
<td>Ogilvy, Alexander</td>
<td>3</td>
<td>46</td>
<td>(15)</td>
<td>3.498</td>
<td>203</td>
<td>20.7</td>
</tr>
<tr>
<td>Finley, Peter</td>
<td>4</td>
<td>44</td>
<td>(7)</td>
<td>3.331</td>
<td>226</td>
<td>23.0</td>
</tr>
<tr>
<td>Forrest, Sir James</td>
<td>5</td>
<td>43</td>
<td>4</td>
<td>3.156</td>
<td>273</td>
<td>27.8</td>
</tr>
<tr>
<td>Grimwade</td>
<td>(9)</td>
<td>37</td>
<td>2</td>
<td>3.092</td>
<td>291</td>
<td>29.6</td>
</tr>
<tr>
<td>Stewart</td>
<td>(18)</td>
<td>29</td>
<td>5</td>
<td>3.245</td>
<td>267</td>
<td>27.2</td>
</tr>
</tbody>
</table>

From Table Two we see some correlation between degree and average distance. Three of the top five persons ranked by degree are also in the top five persons ranked by average distance. Furthermore Richard Law-Smith is the first ranked (i.e. most central) person on both criteria. The other places in the top five are more volatile. Ogilvy, although ranked 3 in terms of degree is only ranked 15th in terms of average distance. Grimwade is 9th in terms of degree but in terms of average distance he is the second ranked person. In fact, with 291 direct and indirect contacts, he has the highest ‘two neighborhood’ (2N) in the network. The disparity between ranking by degree and distance is even more marked in the 1996 network.

**Table Three: Five Most Central Persons, 1996; when ranked by highest degree and when ranked by shortest average distance.**

<table>
<thead>
<tr>
<th>Person ID</th>
<th>Rank by Degree</th>
<th>Degree</th>
<th>Rank by Av. Distance</th>
<th>Average Distance</th>
<th>2N = Two Neighborhood</th>
<th>2N as % of Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greiner, N.F.</td>
<td>1</td>
<td>53</td>
<td>(34)</td>
<td>3.353</td>
<td>175</td>
<td>15.06</td>
</tr>
<tr>
<td>Heeley, Geoffrey</td>
<td>2</td>
<td>47</td>
<td>(16)</td>
<td>3.193</td>
<td>263</td>
<td>22.63</td>
</tr>
<tr>
<td>Kennedy, James</td>
<td>3</td>
<td>46</td>
<td>4</td>
<td>3.077</td>
<td>287</td>
<td>24.7</td>
</tr>
<tr>
<td>Pollard, Dr. Ian</td>
<td>4</td>
<td>46</td>
<td>(25)</td>
<td>3.29</td>
<td>213</td>
<td>18.33</td>
</tr>
</tbody>
</table>
Raynor, Mark M. 5 45 2 3.07 294 25.3
Coates, Alan (29) 32 1 2.995 311 26.76
Burgess, Ian (17) 36 3 3.072 285 24.53
Turnbull, Andrew (6) 42 5 3.104 307 26.42

In the 1996 network there are three people who rank high in terms of degree but drop out of the top five when the ranking changes to average distance. Moreover two of these are the top two persons ranked by degree, Nick Greiner and Geoffrey Heeley. Furthermore their ranking by average distance is a long way down that alternative order. They only rank 34th and 16th respectively. Pollard also falls a long way in the rank order by average distance, he is ranked 25th.

Of the three people who come into the top five when we rank by average distance Andrew Turnbull is not a surprise since he also ranks 6th in the rank ordering by degree. The surprising entrants to the list are Alan Coates and Ian Burgess. Coates is the most extreme movement. He ranks only 29th in terms of number of direct contacts but he has the largest two neighborhood and is the only person to have an average distance of less than three. His two neighborhood reaches 26.76% of people in the network. Burgess’s movement is less extreme but it is still a significant shift.

Thus both networks show a marked disparity between the rank order by degree and the rank order by average distance. This disparity only occurs for certain persons however. In both networks there are people who rank in roughly equivalent positions on both measures. On the other hand, there are two in the top five of each network for whom the rank ordering by each measure is very different. This disparity is more extreme in 1996 than in 1976. Nick Greiner, the top ranking person by degree in 1996 is on 34th in the ranking by average distance. Conversely, Alan Coates, the top ranked person when measured by distance, is ranked 29th by degree.

At this stage we can only speculate about the origins of the disparity between the three career profiles in these networks. In the ‘normal’ profile, degree and distance correlate as we might expect. A second profile involves a lesser number of immediate contacts (i.e. lesser degree) but a high number of second order contacts and a short average distance to all other persons in the network. Grimwade in 1976 and Alan Coates in 1996 exemplify this profile. A third profile is that exemplified most vividly by Nick Greiner, a large number of direct contacts but a proportionately smaller number of second order contacts and relatively high average distance.

It is possible that Greiner and Coates exemplify opposed types of network career. Greiner is an ex Liberal Party Premier. He had a well defined public image before entering business. It is possible that he has accumulated directorships in the large companies which, characteristically, have large boards. There may be a geographic bias in his portfolio of directorships as well. Coates is more of a business insider. He was the managing director of the AMP society until 1986. He then moved into a variety of director and chairmanships. It is possible that these are smaller boards but their members may have a greater number and range of connections than the directors on the boards where Nick Greiner has a seat. More detailed exploration of the portfolios of these individuals will indicate how these different variables operate.

It is possible also to speculate about the systemic impact of different network profiles. The systemic model of network connectivity proposed by Strogatz and Watts (Watts, 1999) emphasizes the importance of the few ‘long distance’ links in a network to the total connectivity of the network. The findings in this paper suggest that certain participants, and forms of participation, build a disproportionate number of these long distance links. Whatever the
individual motivations behind this type of network career, the systemic effects are such that these persons play a critical role for the connectivity of the network although their immediate centrality and visibility may not be high.

Summary of findings and discussion

This paper has examined the network of personal connections among company directors in Australia that arises through their position as members of a company board. The presence of interlocking directors on boards means that even those directors who do not have multiple directorships have the potential to contact directors on other boards as ‘friends of friends’. The ‘small world’ created by these contacts can be measured through the average distance between persons in the network and the scope of contacts they have.

The network among company directors in Australia in 1976 and 1996 has grown in size. It draws in a larger population of directors in 1996 than it did in 1976. At the same time, however, the ‘small world’ of connectivity within that network has become smaller. The average distance between persons has decreased and the average number of contacts at distance one and distance two has increased.7

In this paper we have considered the centrality of persons in the network by examining the network profiles of the five most central participants. Conventionally, point centrality is measured by degree, the number of direct contacts each person has. The most central person is then the person with the highest degree. We have used an alternate measure of centrality as well as this conventional measure. We have ranked participants on their average distance score.

The alternate measures of centrality coincide in the bare majority of cases only. For these persons a high number of direct contacts translate to a good spread of contacts and a low average distance to reach all other members of the network. But there are a number of cases where the measures do not coincide, creating two other distinct types of network profile; a high degree, high average distance profile (Greiner) and a low degree but low average distance profile (Coates). The distribution of geodesic distances for all three types of profile needs closer examination to find the sources of these disparities. In turn, however, we can assume that the different network profiles will be associated with a different portfolio of directorships. By taking this last step of analysis we may be able to see how an individual’s pursuit of their career comes to place them differently in the network. These different careers, in turn, have critical systemic consequences for network connectivity in the ‘small world’ of company directors.

7 A preliminary analysis of the personal networks in the U.S. suggests that the average distance there is much less than in Australia. It is only 2.68 in 1996 as compared to the average distance of 4.34 in Australia. This is very significant difference given the multiplier effect associated with average distance.
References


