

Restructuring or Disintegration of the German Corporate Network:

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Globalization operates not only through the opening of borders to trade and capital but also through the diffusion of institutions and practices and the erosion of traditional forms of national governance. This diffusion is felt keenly in the area of corporate governance and corporate ownership. The German economy is an interesting and important case, as it has long been viewed as representing a prototype called “corporatism” (Amable, 2000; Boyer, 1998). This economy consists of a bundle of complementary institutions that permits a putative equilibrium among corporatist actors: the state, unions, and firms. The claim that these actors act as complements implies that piecemeal change can dangerously undermine this equilibrium; changing one institution without changing all can lead to a precipitous shift in aggregate performance of the economy.

This theory of complementarity is being heavily tested in contemporary Germany. The large private banks are shedding their equity stakes and especially are giving up their positions on boards of German companies. The much discussed European law on corporate governance (still under debate) is supported by German banks, which are willing to put an end to the dual structure of governance. These events represent a reversal of more than a hundred years of history.

The German corporate ownership structures grew out of the expansion of credit lending to investment banking by universal and regional banks (Fohlin, 1998).¹ Even if the origins of these networks provided few private or social externalities, the banks

¹ Germany experienced a large merger wave at the turn of the 1900s, which was smaller than that in the US but nevertheless resulted in highly diversified firms.

clearly played an important coordinating role.² In the era before World War II, competition between industrial companies was regulated via cartel agreements. There is evidence that at that time, banks exerted considerable pressure on defecting companies to persuade them to join a cartel (Pohl 1979).

These early institutional formations have proven to be surprisingly enduring. Despite the introduction of anti-trust policy by the US occupied forces that broke up many of the large Konzerns, German corporate ownership networks continued to display a high degree of cross-holdings *relative to other countries*. The enduring relationship between big German companies, with financial firms in the center of a network of interlocking capital relations and directorates, was unquestionably the outcome of political negotiations in the reconstruction of Germany. The federal and state governments promoted bank and insurance investments in industry. To stabilize these investments, high capital gains taxes were incurred on the sale of block shares, while retained earnings were shielded through reserve provisions. External monitoring of firms by boards was weak and, consequently, financial institutions played an important role in oversight. The lack of economic and social accountability led to a gradual extension of co-determination that allowed employees and unions to participate in company policy.

Corporate governance law in Germany changed dramatically in the 1990s. Corporate control through cross-holdings was lessened through the adoption of “one share, one vote” restrictions. The major universal banks moved rapidly into investment banking and, partly in order to avoid conflicts of interest, shed many of their board ties to

² Riesser (1909) presents one of the most famous studies showing concentration of ownership and bank control. However, many firms resisted bank intervention. See the studies by Weihoener, 1989.

industrial firms. The new corporate tax laws eliminated capital gains on sales of share blocks, thus promoting restructuring. In all, there was a movement toward the Anglo-American model of shareholder and corporate governance.

The impact of these changes on the traditional ties among German financial and industrial firms is highly contested.³ However, there is little doubt that viewed individually, many German firms and banks have sought to re-position themselves while utilizing the discourse of shareholder capitalism. Globalization proceeds in other words on the back of domestic strategies.

However, restructuring need not lead to a disintegration of the historic properties of the ownership network. As found by Kogut and Walker (2001), restructuring reinforces the network when the sales of shares are conducted among “friends”, as had been the case in Germany through the mid-1990s. If there is private value in local neighborhoods (as defined by ownership relationships), then we should see actors strategizing to respond to the impact of institutional changes by attempting willy-nilly to preserve the substance of these ties.

These observations raise the interesting issue of who cooperates and who defects from the task of preserving the network. Is there a fifth column that can be identified by individual attributes (such as profitability) or by structural properties in an ownership network (e.g. centrality)?⁴ We offer below an initial empirical assessment of this question by looking at the number of transactions in which a firm has participated.

Institutional background:

³ An especially pertinent debate is found in Heinze, 2001, the comments of Hoepner and Jackson, 2002, and Heinze’s (2002) response.

⁴ The fifth column originates from the Spanish Civil War in which pro-Franco forces inside a city held by the Nationalists would aid the external attack; the term also serves as a title to a Hemingway play about the war.

As described above, the evolution of German ownership and board ties resulted in a high degree of coordination. The cross-holdings resulted in a pattern by which many firms were controlled by other firms (Konzernierung); boards and capital ties were highly related; and dense personal relationships accompanied the business relationships (Beyer and Hoepner, 2003). The consequence was that Germany evidenced a higher network density (i.e. the number of ties over the theoretical maximum) than any other industrial country (Windolf and Beyer, 1996). Financial companies, particularly Deutsche Bank, Dresdner Bank, Allianz and Münchener Rückversicherung, played central roles in these networks (often in their capacities as “Hausbank”) and were themselves financially tied. At the regional level, governments were shareholders, including in such dominant banks as Bayerische LB and West LB (using their current names). These ties lead to an active cooperation between the banks and regional industrial policy that dates back at least as far as the Weimar Republic (Herrigel, 1996).

Not surprisingly, German capitalism was frequently challenged by both labor and liberal parties. One can almost trace a cycle with twenty year periods in the major state commissions that reviewed monopoly power among banks starting in the early 1900s (allowing for an interruption of the war and early reconstruction).⁵ Beyer (2003) reports that whereas in 1963, a total of 636 joint stock companies were traded on the stock exchange, by 1973 this figure had decreased to 494 and by 1983 to a mere 436. Starting in the 1980s, a number of reforms were introduced to strengthen stock markets, including a 1986 reorganization of the stock market. These changes are perceptible in the increase

⁵ Riesser, 1910; 1930, Enquete Ausschuss, 1926-1931; Monopolkommission, 1977;

in listed companies. Beyer and Hoepner (2003) note that only 436 German companies had been listed in 1983, but at the end of the 1990s their number had risen to 933.⁶

The growth in stock exchange listings was coupled belatedly with changes in corporate governance regulation under the Corporate Sector Supervision and Transparency Act, adopted through the insistence of the Liberal Party that was needed to form a conservative government. This law broke with the long-time tradition of the firm as representing the social interests in favor of a shareholder corporate governance law. In addition, the decision of the labor government to eliminate capital gains tax, and yet allow cross-holdings, encourages the restructuring of ownership through the sales of share blocks. These changes are associated with what appears to be fundamental transformation in the German corporate economy.

Changes in Corporatist Germany:

There is considerable evidence that corporate and corporatist Germany is rapidly changing. The economic performance of Germany has been one of the worse in Europe in recent years. Concomitant with this decline has been the disintegration of many historical ties among firms. Notably, banks are selling block shares in companies and also withdrawing from many boards. In a review of these events, Beyer and Hoepner (2003) report that board interlocks declined among the largest 100 firms from 12 percent of all possible interlocks to less than 7 percent by 1998. Between 1996 and 1998, the number of capital ties between the 100 biggest German companies declined from 169 to 108. Deutsche Bank and Dresdner Bank moved from the center to a more peripheral network position, and Deutsche Bank has announced it will withdraw from all boards.

⁶ Franks and Mayer (2001) report fewer than 800 companies in 1991.

A German and American comparison shares the similarity regarding the impact of changes in tax law on restructuring. The Tax Reform Act of 1986 is credited with the restructuring of US industry, as well as influencing the corporate form (Zey and Swenson, 1999). Similarly, preemptive restructuring in the past few years in Germany is attributed to the anticipatory effects of the “Eichel Plan” that removes capital gains tax on corporate restructuring.

These changes raise profound questions regarding the impact of restructuring on coordination among key corporatist actors. It is interesting that no corporatist actor, in fact, came forward to rescue “Deutschland A.G.”. The unions had long been critical of the collusive implications of these links. The Federal government also viewed these links skeptically. By the mid-1990s, corporate Germany also appeared to defect from its historical position. According to Beyer and Hoepner (2003), the smoking gun is the growth of investment banking as a primary engine of profitability for the troubled German banks. Due to supposed conflicts of interests (especially in the area of hostile takeovers), the major German banks withdrew from many boards and sold shares in companies.

How one views these changes (the extent of which we will assess below) is dependent upon one’s view of the supposed benefits of corporatist Germany in the first place. Gorton and Schmid (2000) found evidence that banks provided value to affiliated companies prior to the 1980s, but these premia evaporated in later years. Edwards and Frank (1998) dismiss the benefits of board representation, noting that, in fact, supervisory boards provide very weak governance.

The study of Franks and Mayer (2001) casts an especially negative light on the overall implications of cross-holdings for the period of 1988 to 1991. They note interestingly that Germany shows an unusually high degree of share block sales. While mergers and acquisitions are only 50% of the UK level, the value of block sales adds another 50%. In effect, ownership changes are about at the same magnitude as in the UK. Of a sample of 171 firms, they found that control was leveraged through pyramid schemes. Allianz, an insurance company, was a participant in 12 of the 33 pyramids. In 23 of these companies, the ratio of voting rights to cash flow rights was greater than one, violating the “one share-one vote” principle adopted by the European Union. Not surprisingly, Franks and Mayer found that transfers of ownership benefited holders of large blocks, but not minority shareholders.

The above studies suggest that the social benefits of the German corporate system have, at best, eroded substantially over the past few decades. This outcome perhaps is not surprising given that Germany evidenced a violation of a basic complementarity in financial markets: the co-existence of dominant shareholders and weakly protected minority shareholders.⁷ However, this violation is not unique to the German case and appears not to induce the same degree of agency problems elsewhere. Rich historical studies show that such governance is often regionally bound, with thick ties between firms, finance, labor, and the state (Herrigel, 1996; Ziegler, 2000). The implication of this perspective is that social goods are provided on the basis of “locality”. National actors may emerge, but they bridge the clustered regions that engage in a high level of coordination.

⁷ However, this observation should be modified by recalling two compensating features of the German system: a share of 25% constitutes a veto right and individual shareholders can challenge major corporate decisions, such as mergers. See Franks and Mayer, 2001, for a discussion of several cases.

There are, in summary, two interpretations of the social implications of the German network. The first stresses the corporatist line of thinking in which clustered networks produce a generalized reciprocity. The second views these claims skeptically, emphasizing instead the agency problems inherent in financial markets with dominant shareholders and weak minority right provisions. It is possible that the two views are consistent with the data, with the switch between a positive and negative network externality driven by exogenous forces, such as cultural change.

One possible exogenous factor is globalization. However, globalization is by and large a smoke screen for the strategies pursued by domestic actors. There is no doubt that globalization has influenced Germany; increasingly the managerial discourse of shareholder value has permeated German companies and financial reports (Hoepner and Jackson, 2002). However, this discourse legitimates the strategies of actors who, by the traditional standard, have chosen to defect from their institutional roles. In this wider sense, globalization proceeds through the strategies of a fifth column.

The coherence of national systems depends then on the resistance of actors to the sirens of a new institutional order. In an earlier work, we argued that the German corporate ownership network was unlikely to undergo radical change (Kogut and Walker, 2001). The emphasis on the number of links overestimates the vulnerability of the system. Statistically, we showed that Germany is a small world characterized by short path lengths among firms (i.e. the average number of ownership links that separate any two firms) and high clustering values (i.e. the proportion of firms whom are tied via common owners to a given firm). Moreover, we showed two other properties: that acquisitions tended to be mediated by highly central firms in these ownership chains and

that, through simulations, the random “rewiring” of ownership ties did not dramatically decay these small world properties.

The studies cited above neglect these structural properties of the network. However, if the value of a network of cross-holdings is to channel information as well as to offer the opportunities to acquire ownership rights, then the important statistics are not simply how many ties but how cohesive are the ties and to whom are firms connected. The degree of cohesion is the property that should capture the externalities –if they should exist—in a neighborhood.

We hypothesize that the inclination of firms to engage in restructuring (as measured by the number of mergers and acquisitions events in which they are engaged) is related to the structural properties of the network. Recall that firms are connected through their owners, as represented by what is called a “bipartite graph”, that is, an affiliation matrix. By analyzing these chains, we measure the structural properties of a network by looking at the centrality of a firm’s owners in the network of German ownership ties.

Data:

German Firms and Owners. The time frame for this study is from 1993 to 2000. We measured German ownership relationships in 1993 and again in 1998. Acquisition events were observed from 1994 to 2000. We used the 1993 network to predict events from 1994 to 1997, and the 1998 network to predict events in 1999 and 2000.

The data used in this analysis come from a handbook compiled by the Frankfurter Allgemeine Zeitung GmbH., which gives broad financial data on the top industrial, financial, and insurance companies in Germany. These include public stock companies

(Aktiengesellschaft), limited liability companies (Gesellschaft mit beschraenkter Haftung), and limited partnerships. In addition to financial data, the handbook reports also owners of record, even if their holdings are quite small (<5%). This information was derived from public financial statements and filings with government offices. The cutoff for reporting owners follows German reporting standards.

To reduce the complexity and scale of the analysis without necessarily reducing its substantive importance, we examined the largest 500 non-financial corporations, the 25 largest banks and the 25 largest insurance firms, as of 1993 reports. For 1998 we examined the 500 largest firms, the 50 largest banks and 50 largest insurance companies. This modest narrowing of the available data produced a sample of 550 firms for 1993 and 600 firms for 1998 that could be engaged in some form of M & A activity. The firms in 1993 were owned by 520 institutions of some form, including other non-financial corporations, banks, insurance companies, cooperative organizations, families, state governments, the German national government, and non-German firms. For 1998, the number of shareholders was 574. Anonymous individual shareholders were excluded from the analysis.

An important decision is the treatment of holding companies, a relatively common form of institutional owner. This form is far more prevalent in Germany than in other industrial countries, including France (see Kogut, Walker, and Anand, 2002). Holding companies raise the problem of how to treat affiliated firms that are listed as companies but belong to a holding company structure. We adopted the practice used in the handbook of recording a firm as owned by the holding company, along with other owners if it was a joint venture or less than fully-owned entity.

Restructuring Events. The data on restructuring events come from the Securities Data Corporation archive on mergers and acquisitions. From 1994 to 1997, there were 101 acquisitions involving the top 550 German corporations, banks and insurance companies, on both side of the transaction. There were obviously a much larger number of transactions involving these firms and smaller firms; however, we are not concerned with these events in this study. The acquisitions we examine are either purchases of an entire corporation, of a corporation's subsidiary, or of a joint venture in which a large firm held a stake. We do not differentiate among these types of acquisition, since each of them entails the same questions about the influence of ownership chains. For the period 1999-2000, there were 106 restructuring events.

Firm variables. The handbook also provides data on the firm's number of employees, the region (land) in which the firm is domiciled, the SIC codes of its businesses, and if it is a public firm, its profits, revenues and capital resources.

Methods:

Constructing the Network of Ownership Ties. An ownership tie consists of a linkage between two firms through a common owner. These ties for all the firms in our sample compose an affiliation network. (See Wasserman and Faust 1994: Chapter 8, for a discussion and listing of previous studies of this kind.) Analyzing such networks has a broad tradition and differs slightly from the more commonly studied relational networks that indicate direct ties between actors. The ownership network among the 550 German firms for 1993 (600 for 1998) is simply the affiliation matrix among them. In many ownership networks such as ours not all firms will be connected. It should also be clear

that firms can be linked by more than one owner. In our method, multiple common owners still result in a tie of one between two firms.

Using the affiliation network, we constructed a distance matrix among the firms. The distance between two firms is the smallest number of firms linking them through common owners. Thus if companies A and B share an owner and companies B and C share an owner, the distance between A and B is two.

Network variables – clustering, path length and centrality.

The statistical analysis seeks to understand the relationship between the properties of the network and the decisions to restructure. We utilize three statistics by which to describe the network: clustering coefficient, path length, and centrality. The clustering coefficient and path length are defined in the introduction to the articles published in this issue.

A firm's centrality in the ownership network is measured by calculating how many shortest paths – called geodesics - between other firms it lies on. This measure, called betweenness, captures the extent to which a firm “brokers” relationships in the network (see Freeman, 1979). To derive a firm's betweenness score, let b_{jk} be the proportion of all geodesics linking firm j and firm k on which firm i lies. The betweenness of firm i is the sum of all b_{jk} . To normalize betweenness in order to account for the size of the network, the betweenness score for a firm is divided by the maximum possible betweenness in the network.

Predicting restructuring Events

To predict the number of restructuring events a firm is involved in, we use negative binomial regression with Huber-White-Sandwich correction. This technique

recalculates the residuals to account for lack of independence among them. This correction is advisable since many German firms are involved in more than one event and are repeated across the 1993 and 1998 panels.

Descriptives and Small World Descriptives:

Descriptive data on the German firms and their owners in 1993 and 1998 are shown in table 1. Table 1 presents the potentially surprising fact that the modal ownership percentage is between 90 and 100%. Logically, the next most prevalent percentage is between 0 and 10%. 1993 and 1998 differ very little in this pattern. In other words, German firms tend to have dominant owners.

Table 2 presents simple network descriptive data and the small world estimates. Density is quite low, as expected. Moreover, the average degree distribution (that is, the average number of ownership links) is relatively high. Our estimate of the coefficient to a power law distribution is about 2.5 for both networks, showing a very skewed distribution whereby a few firms and owners are especially highly linked. It is important to note the network is disconnected; the main component is 275 for firms, and 497 for owners, both substantially smaller than the total sample of firms or owners, respectively.

Results:

Table 3 shows the results from predicting firm involvement in a restructuring event. The dependent variable is the number of transactions in which a firm is engaged. We would like to know if the number of participations is influenced by the firm's characteristics (e.g. its size) and by its position in a network. By position in a network, we mean two distinct properties. The first is the closure of its cluster. Here we want to know if firms located in closed neighborhoods (i.e. where its owners tend to own shares

in the same firms) tend to be more loyal and hence less involved in restructuring. The second measure is the centrality of its owners as a way to address the issue of whether highly central owners act as “brokers” and increase the number of transactions. The cluster value, thus, should depress transactions, while the presence of a central owner may act to increase transactions but, presumably, in ways to preserve its influence. After all, we know already that the German network remains a small world. These regressions then perform an investigation to understand the role of particular actors in this preservation.

Note that we do not specify whether the firm is a buyer or target in these runs. One of the problems in differentiating between the two sides of the event here is that many events involve the sale of a unit, in which case the target can logically be larger than the acquirer and more or less profitable. We leave fine tuning of our model suggested by the separation of targets and acquirers to future work.

The results are given in Table 3. Firm size in employees consistently and strongly influences involvement in restructuring, as does the firm’s net profits, but not revenue. Also, both regions and industries are highly significant differentiators of firms active in restructuring, as expected. In order to avoid showing a long list of regional and industry dummies, we simply show the chi-square test of adding in the dummies to the regression with the degrees of freedom (d.f.).

More important are the findings for firm clustering and owner centrality. Clustering is never significant, indicating that there is no indirect effect of the immediate ownership neighborhood on the incidence of an event. However, owner centrality

consistently increases the likelihood of restructuring. Being owned by a dominant owner, in network terms, therefore raises the probability of buying or selling business units. Interestingly, owner centrality influences firm restructuring in both 1993 and 1998, but not to the same degree. The effect significantly declines over the decade ($X^2 = 14.73$, $p < .0001$).

Table 4 shows the most central owners in 1993 and 1998. Roughly half of the dominant owners in 1993 remain so in 1998, and roughly half of these are the traditional large financial institutions – Allianz, Deutsche Bank, Commerzbank, and Dresdner Bank. Four of the newly central owners are German states – Bavaria, Baden Wurttemberg, North Rhine – Westphalia, and Lower Saxony – four of the five top regions measured in terms of corporate offices. The emerging relationship between restructuring and geography in Germany thus entails location as both domicile and shareholder.

These results offer the following speculation that coordination has increasingly become a regional affair. We find that clustering itself does not matter; the degree of clustering among friends is not related to the number of acquisition events. However, centrality does matter, as does regional location of the firm. From Figure 4, we see that many of the most central owners in 1998 were local governments. Through ownership ties, the local governments have sought to influence restructuring to preserve a degree of coordination at the regional level. If these results are shown to be confirmed by future research, they have an important implication. In a time of globalization and of the creation of a European Union, national coordination in Germany may be passing to regions and regional governments.

Conclusions:

Recent German history reveals a pattern of correlated events: globalization, institutional changes -especially in the sphere of corporate taxation and corporate governance law - and restructuring of capital ties. The reduction of holdings by particularly prominent financial institutions reinforces the inference that a kind of percolation threshold has been passed. These trends point to a disintegration of the German ownership network.

However, an analysis of the German corporate network does not support these broad claims. In part, our analysis may differ from other studies on Germany because our sample is larger than that found in these other studies. But the primary difference lies in methodology: we compare the network properties over time and we relate restructuring decisions to these properties. What our results indicate is the persistence of network structure in the sense of a small world of firms connected by owners. In some ways, this confirms the contention that corporate governance is lodged in fairly stable and path dependent relationships (Bebchuk and Roe, 1999).

The interesting question is why, when looking at these relationships at the micro-level, firms would persist in these patterns. We find that profitability itself is a predictor of the willingness of firms to participate in restructuring events. But in addition, restructuring is predicted by the extent to which firms belong to a neighborhood where central owners act to reshape the corporate ownership network. In this more micro analysis, we find in fact that there are significant changes over the 1990's in the roles of central actors, including financial institutions: Central owners no longer play an important role in providing the externalities (either of information or of coordinating) by 1998. Interestingly, the regions - both as owners and as a location of corporate

headquarters - continue to play their historical role. We thus have a reaffirmation of what Herrigel (1996) found: regions have an important spatial property in the organization of German capitalism.

If these results hold, they cast light on the efficacy and limitations of corporate law as a determinate of corporate governance. The importance of law to corporate governance has been emphasized in particular by La Porta and his colleagues (La Porta et al., 1998, 2000) who find a relationship between financial market development and legal protections of minority shareholders. It seems likely that changes in the corporate governance and tax code have influenced the strategies of firms. These changes echo Davis and Mizruchi (1999) regarding the decline of American bank centrality. Much as the centrality of banks passed to institutional investors in the US (Davis and Yoo, 2002), a similar transition may be taking place in the German context.

However, the persistence in the overall network structure of ownership suggests that the macro structure remains robust. After all, legal changes are hardly “exogenous”: laws change in response to strategies of firms, political parties, unions, and employees. While the new law allows for corporate restructuring –by reducing the fiscal implications—and protects minority investors, the law has not prohibited cross-holdings among firms and banks (as in the US). This omission is not by accident, because the restructuring among firms and banks has not destroyed the traditional ties within “clusters” or neighborhoods. German capital remains highly local.

Globalization and the adoption of more Anglo-Saxon type of governance reflect the domestic strategies of German actors. These actors want to restructure without fiscal consequences, but they do not want to restructure contrary to their history. What is the

advantage then to these clusters? Our analysis points, at this stage, to an intriguing answer: the advantage is maintained by state-owned banks and local state governments who continue to exercise control through well-structured cross-holdings. German capitalism is not global; it is not national; it is regional.

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Table 1

Frequencies of Ownership Percentage
Top Firms, Banks, and Insurance Companies
Germany, 1993 and 1998

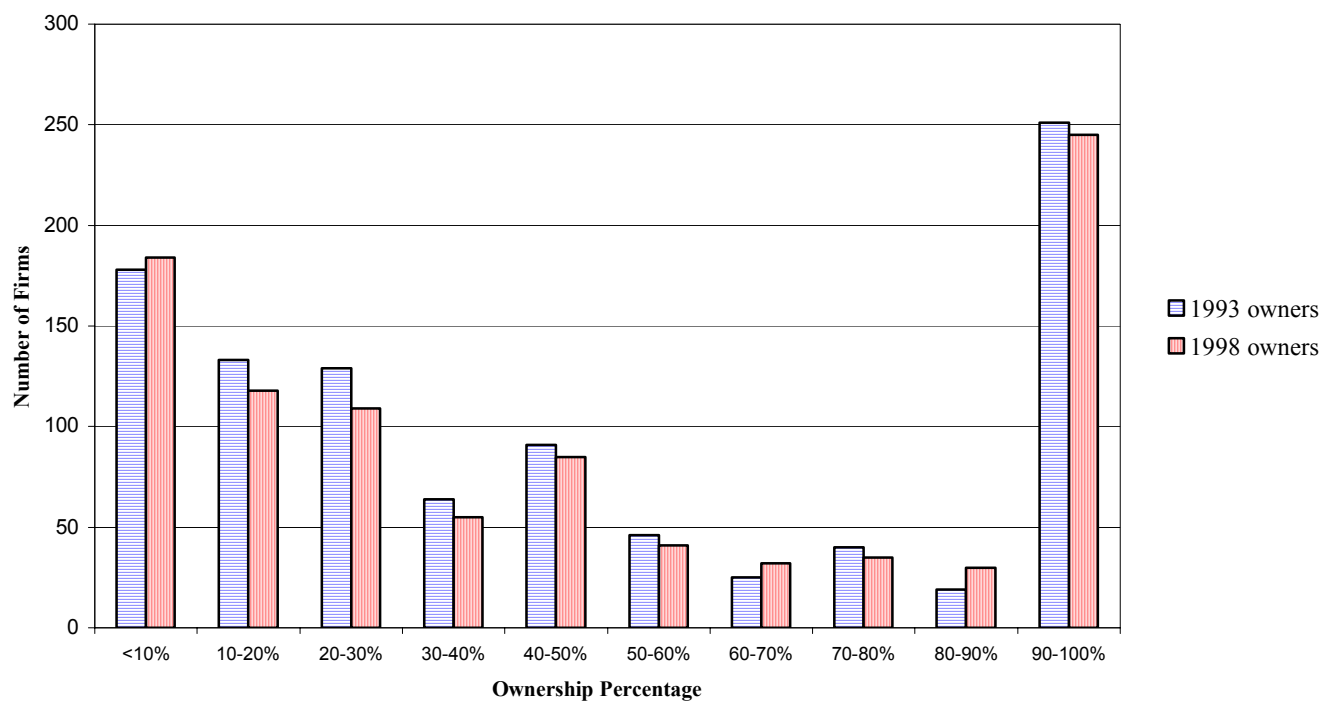


Table 2

Small World Statistics for the German 1998 Network

<i>Variable</i>	<i>Firms</i>	<i>Owners</i>
Density		
Density for all firms ^a	0.004	0.04
Average number of links for all firms	2.66	2.03
Density for network of connected firms ^b	0.02	0.01
Average number of links for connected firms	5.8	2.95
Clustering		
Clustering coefficient of the connected firms	0.95	0.88
Clustering coefficient of a random graph with same size and number of links per firm for connected firms	0.01	0.01
Path length		
Average path length among the connected firms	3.45	5.20
Expected average path length in a random graph with same size and number of links as connected firms	3.19	5.74

a Total number of firms = 600

b Number of connected firms = 275; number of connected owners = 497

Table 3

Negative Binomial Regression
Predicting the Participation in Merger Events
(standard errors in parentheses)

(log) Number of Employees	.28*** (0.059)	.232*** (0.062)	.22** (0.063)	.202** (0.063)
Net Profits	.00038** (0.00013)	.0003** (0.0001)	.00028** (0.00014)	.00044** (0.00017)
Revenues	-0.000001 (0.000005)	0.00001 (0.00001)	-0.000003 (0.00007)	-0.000002 (0.000008)
Region		1396.81*** 12 df	3483.98*** 12 df	1102.94*** 12 df
Industry		6416.07*** 66 df	3260.19*** 66 df	3437.46*** df 68
Clustering			-0.288 (0.213)	-0.227 (0.221)
Maximum Owner Portfolio Size			0.0015 (0.021)	-0.034 (0.023)
Maximum Owner Centrality 1993			4.76** (2.39)	12.089*** (3.21)
Maximum Owner Centrality 1998				5.37** (2.49)
Constant	-3.47*** (0.543)	-1.54*** (0.68)	13.34*** (3.01)	13.42*** (1.28)
Log-likelihood N	-572.03 738	-522.97 738	-515.36 738	-508.18 738

Table 4

Top Twenty Owners - Centrality

<u>1993</u>		<u>1998</u>	
Rank	Owner	Rank	Owner
1	Deutsche Bank AG	1	VEBA AG
2	West LB Group	2	Allianz group
3	Allianz group	3	Region of Bavaria
4	VEBA AG	4	Münchener Rückversicherungs-AG
5	RWE AG	5	RWE AG
6	Dresdner Bank AG	6	Deutsche Bank AG
7	VIAG AG	7	Region of Baden - Wurttemberg
8	Wintershall AG	8	VIAG AG
9	AGIV AG	9	Dresdner Bank AG
10	Rütgerswerke AG	10	Mannesmann AG
11	Thyssen Krupp Group	11	DG Bank
12	Lahmeyer AG für Energiewirtschaft	12	West LB Group
13	DG Bank	13	Commerzbank AG
14	Technische Werke	14	Thyssen Krupp Group
15	Bayernwerk AG	15	DaimlerChrysler AG
16	Bayerische Landesbank Girozentrale	16	Mobil Petroleum
17	Deutsche Bahn AG	17	Bayerische Hypo- und Vereinsbank AG
18	Mobil Petroleum	18	Region of Lower Saxony
19	Commerzbank AG	19	Region of North Rhine - Westphalia
20	Vermo Vermögensverwaltung GmbH	20	RAG AG