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Universal banking and the performance of German firms☆

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Abstract

We empirically investigate the influence of German universal banks on the performance of German firms. We take into account banks' control rights from equity ownership, banks' proxy-voting rights, and the concentration of control rights from equity ownership (which includes complex forms such as pyramids, cross-shareholdings, and stocks with multiple votes). We also account for voting restrictions and the German codetermination system (under which employees of large firms have control rights that are unrelated to equity ownership). We find that firm performance improves to the extent that equity control rights are concentrated. Moreover, bank control rights from equity ownership significantly improve firm performance beyond what nonbank blockholders can achieve. © 2000 Elsevier Science S.A. All rights reserved.

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1. Introduction

German universal banks appear to be powerful institutions in that they can own blocks of equity and vote individual shareholders' votes in proxy. This system has been controversial for over a century (e.g., Hilferding, 1910) and is addressed more recently in the report of the Gessler Commission (e.g., Studienkommission, 1979; Krümmel, 1980), but apart from Cable (1985) there has been no empirical analysis of this corporate governance system and there is certainly no agreement about the effects of German banks on the performance of firms.

One view of the German system is that German banks are large, active, informed investors that improve the performance of firms to the extent that they hold equity and have voting power from casting the votes of small investors in proxy. Banks are seen as long-term investors who oversee firms' investments and organize internal capital markets, rather than acting as myopic investors (e.g., Porter, 1992; Grundfest, 1990). The banking relationship mitigates the costs of both external financing and of actively monitoring management. Proponents of this view see German banks as a model of active block shareholders that should be emulated in stock-market-based economies (where shareholders are dispersed and institutional investors are passive). For example, Grundfest (1990) asserts: "In Germany, large banks and industrial combines exercise substantial influence over the operation of many companies and are able to effect management and strategic changes when circumstances warrant" (p. 105).

Critics of universal banking see the enormous power of banks as harmful because of conflicts of interest that a bank faces when it simultaneously is a large equity holder in the firm, is in control of a large number of proxy votes, controls access to external capital markets, and has loans outstanding to the firm. Because banks themselves seem impervious to external control, the concentration of power in banks is seen as allowing them to essentially run firms in their own interests. For example, banks can refuse to allow cash to be paid out of firms in order to maintain "hidden reserves". Or a bank might force a value-reducing merger between a distressed and a nondistressed firm, both of which it controls. Wenger and Kaserer (1998) express this unfavorable view on German banks:

> … German banks do not only provide industrial companies with loan capital but also exercise considerable voting power in stockholder

> meetings of many public corporations. This is partly due to proxies of their clients and partly due to stock ownership. … we would argue that this specific institutional environment does not reduce agency problems; on the contrary, this situation is prone to enlarge and perpetuate these problems (p. 50).

Banking laws in Germany do not legally restrict commercial banks from holding blocks of equity in nonfinancial firms. Consequently, banks can have control rights in the form of votes that they would not have in the U.S., for example. As we will see below, however, bank blockholding is not so pervasive in Germany, while blockholding by nonbanks is extensive. The control rights of these blockholders can be limited by voting restrictions. For example, the voting rights of shareholders can be restricted by the firm's charter to a maximum fraction in the firm's total voting stock, regardless of the fraction of shares owned. While voting restrictions apply to any shareholder, banks can potentially exercise more votes because voting restrictions generally do not apply to votes that banks cast on behalf of small shareholders. For example, a firm can be owned by a single bank with 5% of the shares, a nonbank blockholder with 50% of the shares, and dispersed shareholders with the remainder. If there is a voting restriction constraining the votes of the nonbank blockholder to 10%, and if the bank further controls all of the proxy votes of the small shareholders, then the bank, in the absence of any other considerations, effectively controls this firm. (Changes to the firm's charter typically require a 75% majority.) Note that this could occur even if the bank owned no shares. In such a case, there is no link between cash-flow rights and control rights.

It is not only the role of German banks that has been controversial. There is an extensive literature on codetermination, that is, the laws requiring that firm employees hold voting seats on the supervisory boards of large firms. (In Germany, limited liability companies have a two-tiered board system.) Because of codetermination, governance of German firms does not depend solely on possession of control rights in the form of votes attached to equity shares. The controversy emanates from the ideological implications of dictating that some of the owners' control rights effectively be ceded to labor. Codetermination, for example, means that a large firm owned by a single shareholder, or perhaps a family, cannot appoint all the directors on the supervisory board. Under the two-tiered board system, management is insulated, at least to some extent, from discipline by shareholders. While the literature on German codetermination is massive, there is relatively little quantitative work assessing the impact of codetermination on firm performance; Gorton and Schmid (1998) provide a brief survey.

The theoretical effects on firms of the codetermination system are difficult to assess because the objectives of the employees are not obvious. On one hand, to the extent that employees are residual claimants by virtue of their investment

of, possibly, firm-specific human capital, they will govern in the interests of shareholders. On the other hand, if their human capital is not diversifiable, risk-averse employees' objectives can differ from those of shareholders. In essence, codetermination reduces the value of control rights from equity ownership. In fact, Gorton and Schmid (1998) find that with employees on a firm's board, firm resources are directed to less productive uses, decreasing the return on assets, the return on equity, and the market-to-book ratio of equity.

Universal banking, proxy voting, and codetermination suggest that, in reality, corporate governance in Germany is much different from the system described by received theory (see La Porta et al., 1999a). In theory, corporate governance is based on the system of one share, one vote, an apparently incentive-compatible way of linking claims on cash flows with control rights. (Grossman and Hart, 1988; Harris and Raviv, 1988, provide the theoretical arguments for the optimality of one share, one vote.) Germany, however, is clearly different from that model. Little is known about the German system due to a lack of theory rich enough to provide predictions in such a complicated setting, as well as a lack of data. Disclosure requirements in Germany simply do not exist to the same extent as in Anglo-American stock-market-based economies. Nevertheless, in this paper we empirically investigate corporate governance in Germany. We study four data sets covering 1975 and 1986, each with different advantages and disadvantages.

An empirical description of the effects of the above corporate governance characteristics on the performance of German firms requires that we distinguish between equity ownership per se and the control rights that are derived from it. We need measures of control rights and control rights concentration, which we can link to firm performance by some functional relation. Each of these steps is fraught with difficulty. With respect to control, one measure of control or power is the number of votes controlled by ultimate shareholders, following La Porta et al. (1999a). Measuring control rights concentration requires a theoretical model of how large shareholders interact. While such models exist, they are based on voting behavior that implicitly assumes that cash-flow rights and control rights are closely linked. Moreover, these models cannot accommodate blockholders with different information, proxy voting, and voting restrictions. As we discuss below, we adopt the Herfindahl index as a measure of concentration that can be applied to the German case. Firm performance is not straightforward to measure either. Since Germany is less reliant on the stock market and has fewer disclosure requirements, we face the choice of relying on (German) accounting measures of performance or on market-based measures. The latter choice requires us to restrict our attention to publicly traded firms, an assumption that seems counter to the spirit of the investigation. We therefore use both accounting-based and market-based measures of performance.

There is also little theoretical guidance about the functional link between equity ownership and firm performance once the connection between cash-flow

rights and control rights has, at least to some extent, been broken. Even for the more straightforward case of one share, one vote, as in the U.S., the relation between firm performance and the ownership stake of management has been argued to be nonlinear. Morck et al. (1988), for example, examine the effect of insider concentration (the fraction of firm equity owned by top management) on nonfinancial firms' performance measured by Tobin's Q and find a piecewise linear, U-shaped relation. See also McConnell and Servaes (1990), who also examine U.S. nonfinancial firms, and Gorton and Rosen (1995), who analyze U.S. banks.

The German case is even more complicated than the U.S. case. While it is clear that the more cash-flow rights in a firm a party has, the more this party will want to improve the firm's performance, it is not clear what the objective function is for a party with control rights substantially in excess of cash-flow rights. This party might be interested in extracting private benefits rather than improving the value of cash-flow rights to which it has only a small claim. Thus, an important difficulty with analyzing the effects of banks on firms in Germany is that the bank can face conflicts of interest over some ranges of bank equity holdings, proxy-voting, and other (i.e., nonbank) shareholdings, but not over other ranges. Moreover, voting restrictions clearly can have an impact. But aside from considerations of the distribution of effective voting power in relation to cash-flow rights, codetermination undermines the power of votes attached to equity shares. The power of banks, to the extent that it is not derived from ownership in voting stock, can further undermine equity control rights.

In our empirical investigation of the influence of German universal banks and codetermination on the performance of German firms, we take into account banks' control rights that emanate from ownership of voting stock, banks' proxy-voting rights, the concentration of control rights from equity ownership, and voting restrictions. Equity ownership can involve pyramids, cross-shareholdings, and stocks with multiple votes. Because of the complexity of the firm's control structure, we test semiparametric specifications against various parametric specifications to determine the appropriate shape of the relation. This allows us to test for conflicts of interest between firm shareholders and banks, and between employees and shareholders. Further structure is then imposed in the form of a parametric specification. We also examine the influence of banks and employees on boards of directors.

The paper proceeds as follows. In Section 2 we describe the samples and discuss issues concerning the measurement of control rights in Germany. We also discuss the construction of variables that will be used in econometric tests. In Section 3 we propose hypotheses. Section 4 outlines the econometric methodology. Section 5 presents the basic set of results. Section 6 analyzes banks' representation on corporate boards. Section 7 is a discussion of the results. Section 8 is a brief conclusion.

2. Measuring control rights, control rights concentration, and the performance of German firms

Four issues are critical to our empirical analysis. First, we must construct a measure of equity control rights from data on ownership of (voting) stock. Second, we need a measure of concentration of the equity control rights. Third, we need a measure of firm performance. Finally, we need a functional specification for the link between control rights, control rights concentration, and firm performance. In this section we introduce the data sets. We then discuss two of the three measurement issues. We summarize the equity control rights structure of German firms based on our samples and we discuss voting restrictions. Finally, we address the third measurement issue and discuss firm performance measures and some other variables that we will use later.

2.1. Data samples

Our data sets, discussed in detail in Appendix A, consist of four cross-sections of large public limited companies known as Aktiengesellschaften (AGs). For each of the years 1975 and 1986 we have a small sample and a large sample. The German economy has been changing rapidly in the last decade, and possibly earlier as well. In order to study the economy prior to these changes, we start as far back as data availability will reasonably allow, i.e., 1975, but then include samples from ten years following in order to see if there are changes over the period 1975–1986.

The small samples are restricted in size due to the costs of collecting data on proxy voting. Furthermore, not all of the firms in the small samples are publicly traded. The small samples consist of 82 firms in 1975 and 56 firms in 1986. When restricted to firms with traded equity, the sample sizes are 54 and 42, respectively. The large samples consist of 283 firms in 1975 and 280 in 1986, all publicly traded. The small samples enable us to study the effects of proxy voting; for the large samples, proxy voting information is not available.

2.2. Measuring control rights

It is not obvious how to measure control in Germany. The issue is complicated, first of all, because pyramiding, cross-shareholding (or circular ownership) and stocks with multiple votes separate cash-flow rights from control rights in the form of votes. Franks and Mayer (2000) and Emmons and Schmid (1998) discuss these structures in Germany while Wenger and Kaserer (1998) discuss the legal background. La Porta et al. (1999a) argue that a measure of control or power should be based on control rights that emanate from voting shares. We proceed similarly and calculate the control rights held by different parties, as explained below. It is not clear, however, that this procedure accurately defines

control because of other complications besides pyramiding, cross-shareholding, and the existence of stocks with multiple votes. For example, as mentioned above, equity ownership is not the only legal basis for control because, under the system of codetermination, employees have votes on the supervisory board that are unrelated to holding shares. Thus, our strategy is to follow the concept of La Porta, Lopez-de-Silanes, and Shleifer, while taking account of all the other dimensions of governance with additional variables.

Cross-shareholding occurs when firms hold shares in each other, either directly or indirectly. An example of indirect cross-shareholding would be a triangular ownership structure with Firm A owning a block of Firm B's equity, Firm B owning a block of Firm C, and Firm C holding a stake in Firm A. There is a notable network of (mainly indirect) cross-shareholdings centered on Allianz AG, Germany's largest insurer (Wenger and Kaserer, 1998). This network comprises predominantly financial services firms. Outside this network, there are rare cases of cross-shareholdings, mainly among government-controlled utilities. In our samples (which exclude financial services firms), cross-shareholdings are not significant, as shown below.

Pyramiding occurs when Firm A owns a stake in Firm B, which owns a stake in Firm C. La Porta et al. (1999a) define a pyramid as a chain of firms in which the chain includes at least one publicly traded company between the sample firm and the ultimate owners. (We discuss the notion of an "ultimate owner" below.) This definition will not suffice for Germany, as the middle firms in pyramids are almost invariably not traded. The typical case of pyramiding in Germany is joint ownership of nonfinancial firms, banks, or insurers in a financial holding shell (called Vermögensverwaltungs-, Vorschalt- or Beteiligungsgesellschaften) that holds a (controlling) stake in the sample firm. An example is Mercedes-Automobil-Holding AG, which (before it was dissolved in 1994) held a controlling stake in Daimler-Benz AG and was owned by a multitier shareholder structure that consisted mainly of financial firms (Franks and Mayer, 2000). Typically, a financial holding shell is not traded, has few or zero employees, exists solely to hold the stock of another firm, and has two to four owners, among them banks and insurance companies. In the case of Germany we say that pyramiding occurs when the sample firm's stock is held indirectly via (one or more) financial holding shells.

Fig. 1 shows a typical example of a pyramid in our samples. Following our principle of deriving control rights from votes, the figure displays ownership as percentages of votes (which is not necessarily identical to the percentages of equity these votes emanate from). Technocell AG has one blockholder, MD Verwaltungsgesellschaft Nicolaus GmbH & Co. KG, which owns 51%. This company, in turn, is owned by the Nicolaus family, with 60%, and by Burda GmbH, with 40%. MD Verwaltungsgesellschaft Nicolaus GmbH & Co. KG and Burda GmbH are not publicly traded. In this example, control rights are allocated as follows. The Nicolaus family holds 51% of Technocell and Burda

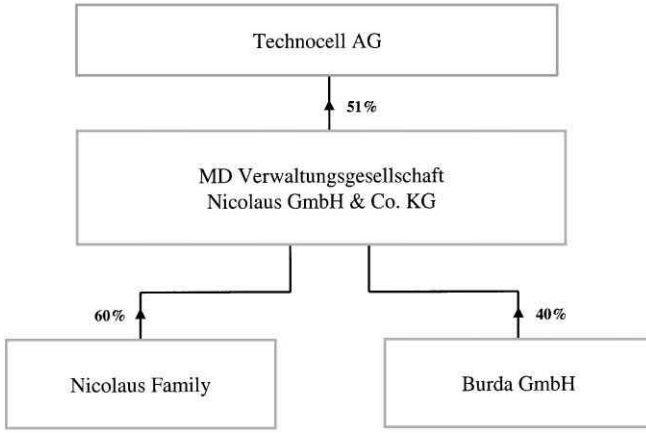

Fig. 1. Technocell AG as an example of a simple pyramid, September 1986. Following our principle of defining control rights based on votes, the graph displays ownership as fractions of votes (which is not necessarily identical to the fractions of equity from which these votes emanate). Technocell AG has one blockholder, MD Verwaltungsgesellschaft Nicolaus GmbH & Co. KG, which owns 51%. This company, in turn, is owned by the Nicolaus family, with 60%, and by Burda GmbH, with 40%. MD Verwaltungsgesellschaft Nicolaus GmbH & Co. KG and Burda GmbH are not publicly traded. In this example, the Nicolaus family and Burda GmbH are the ultimate owners. The control rights are allocated as follows. The Nicolaus family holds 51% of Technocell and Burda GmbH holds 40%. That is, control rights are assigned based on the weakest link in the chain (La Porta et al., 1999a). Data source: *Saling Aktienführer* 1987, Verlag Hoppenstedt, Darmstadt 1986.

GmbH holds 40%. That is, control rights are assigned based on the weakest link in the chain (La Porta et al., 1999a).

Few firms have stocks with multiple votes. While it has long been illegal in Germany to issue such stocks, those that existed prior to the change in legislation were grandfathered. There are only a few firms in our sample that have stocks with multiple votes, such as RWE AG and Siemens AG. In the case of RWE, a utility, provincial and municipal authorities hold stock that is endowed with 20 votes per share. In the case of Siemens, the family holds stock with six votes per share in certain decisions (as determined by the company charter). When we calculated control rights, we did so based on number of votes, not on number of stocks. In the case where multiple votes apply in certain circumstances only, such as with Siemens, we assumed the multiple-votes case.

Determination of control rights in complicated ownership structures (such as pyramids and circular ownership) depends on a definition of the *ultimate owner*, the agent at which tracing the ownership structure stops. We categorize firms into the following ultimate owners: banks (domestic and foreign), insurance companies (domestic and foreign), families and family trusts (domestic and foreign), government and government trusts (domestic and foreign), foreign

financial holding shells (ownership data on these companies are generally not available), nonfinancial firms (domestic and foreign; no financial holding shells), and the sample firm itself (in the case of circular ownership). This classification of ultimate owners follows La Porta et al. (1999a) except that we include nonfinancial firms as ultimate owners. This is because we often reach a point in the chain at which we cannot trace the holdings further because the (nonfinancial) firms are not publicly traded or there are insufficient data to determine the control rights structure. Recall that our samples are from the 1970s and 1980s, periods during which ownership data are sparse. Clearly, there is a certain arbitrariness to this procedure, but this is dictated by the data limitations that emanate from studying an economy that is not (at least during our sample periods) centered on the stock market. In the same vein, La Porta, Lopez-de-Silanes, and Shleifer do not break up firms that are not publicly traded, presumably because of a lack of data.

Table 1 shows the extent of pyramids, cross-shareholding, and circular shareholding in our samples. The table also shows the classification of our four samples into ultimate owners with a 25% cutoff rule. (The cutoff rule is based on control rights; it is applied for illustration and used in this table only; it is not used in the subsequent quantitative analysis.) La Porta et al. (1999a) introduce such a cutoff rule to isolate the shareholders in control from those not in control. We define the cutoff level to be 25% because corporate charters in Germany make this percentage a powerful block.[1] The ultimate owner with the largest fraction of control rights is deemed the largest ultimate owner, but there can be more than one such "largest" ultimate owner because of ties. With respect to types of ultimate owners, there are no appreciable differences in the samples between the two years analyzed. In our large samples, less than 20% of the firms are widely held, even less than in La Porta et al. (1999a), who use a 20% cutoff rule and find that 50% of the firms in Germany are widely held. In our small samples, roughly 35% of the firms are widely held.

2.3. *Measuring concentration*

When we measure control rights concentration, we do not rely on a theoretical model as a basis for a concentration measure. Existing models of how large shareholders interact are based on probabilistic voting behavior under the assumption of one share, one vote. In addition, these theories are based on environments in which all shareholders are alike except that they have differing numbers of votes, e.g., the Shapley-Shubik Power Index (Shapley and Shubik,

[1] In general, votes at the annual meeting require a simple majority (50% plus one vote). However, changes to the charter (including equity issues) require approval of at least 75% (a "qualified majority") of the votes. Companies, in the charter, can set higher levels than the legal minimum of three-quarters of the votes, but few companies choose to do so.

Table 1
Ultimate owners based on control rights that emanate from equity ownership. We follow La Porta et al. (1999a) when applying a cutoff rule to control rights (i.e., shareholders that control a smaller fraction of votes are not taken into account). Such a cutoff rule is employed in this table only, but not in subsequent tables or the empirical analysis. The cutoff rule applies to items 2, 3, and 4. We chose 25% as the cutoff level because this is an important threshold in Germany, as changes to the firm's charter generally require a 75% majority. The types of ultimate owners (item 3) and the types of largest ultimate owners (item 4) are not mutually exclusive because of the possibility of ties. Panel A: small samples. Panel B: large samples.

Equity Ownership Types	1975 Sample	1986 Sample
Panel A		
(1) Multi-Level equity ownership		
Pyramids (total)	10 (12%)	11 (20%)
Same shareholder owns directly and through pyramid	2 (2%)	2 (4%)
Circular ownership	1 (1%)	0 (0%)
(2) Existence of ultimate owners		
Ultimate owner exists	51 (62%)	39 (66%)
No ultimate owner exists	31 (38%)	19 (34%)
(3) Types of ultimate owners		
Banks (domestic or foreign)	24 (29%)	22 (39%)
Insurers (domestic or foreign)	7 (9%)	11 (20%)
Family, incl. family trusts (domestic or foreign)	11 (13%)	9 (16%)
Government (domestic or foreign)	13 (16%)	10 (18%)
Foreign financial holding shells	0 (0%)	2 (4%)
Nonfinancial firms (domestic or foreign)	25 (30%)	22 (39%)
Firm itself (circular ownership)	1 (1%)	0 (0%)
(4) Types of largest ultimate owner		
Banks (domestic or foreign)	20 (24%)	9 (16%)
Insurers (domestic or foreign)	7 (9%)	4 (7%)
Family, incl. family trusts (domestic or foreign)	11 (13%)	7 (13%)
Government (domestic or foreign)	12 (15%)	10 (18%)
Foreign financial holding shells	0 (0%)	2 (4%)
Nonfinancial firms (domestic or foreign)	19 (23%)	11 (20%)
Firm itself (circular ownership)	0 (0%)	0 (0%)
(5) Sample size		
Total number of firms	82	56
Number of publicly traded firms	54	42
Panel B		
(1) Multi-level equity ownership		
Pyramids (total)	12 (4%)	22 (8%)
Same shareholder owns directly and through pyramid	2 (1%)	4 (1%)
Circular ownership	1 (0%)	1 (0%)
(2) Existence of ultimate owners		
Ultimate owner exists	238 (84%)	226 (81%)
No ultimate owner exists	45 (16%)	54 (19%)

Table 1 (*continued*)

Equity Ownership Types	1975 Sample	1986 Sample
(3) Types of ultimate owners		
Banks (domestic or foreign)	83 (29%)	61 (22%)
Insurers (domestic or foreign)	18 (6%)	18 (6%)
Family, incl. family trusts (domestic or foreign)	56 (20%)	77 (28%)
Government (domestic or foreign)	17 (6%)	21 (8%)
Foreign financial holding shells	1 (0%)	6 (2%)
Nonfinancial firms (domestic or foreign)	161 (57%)	147 (53%)
Firm itself (circular ownership)	1 (0%)	0 (0%)
(4) Types of largest ultimate owner		
Banks (domestic or foreign)	65 (23%)	34 (12%)
Insurers (domestic or foreign)	14 (5%)	8 (3%)
Family, incl. family trusts (domestic or foreign)	49 (17%)	67 (24%)
Government (domestic or foreign)	15 (5%)	18 (6%)
Foreign financial holding shells	0 (0%)	5 (2%)
Nonfinancial firms (domestic or foreign)	135 (48%)	117 (42%)
Firm itself (circular ownership)	0 (0%)	0 (0%)
(5) Sample size		
Total number of firms	283	280
Number of publicly traded firms	283	280

1954) or the Banzhaf Index (Banzhaf, 1965, 1968). Leech (1988) and Leech and Leahy (1991) and the references cited therein provide further discussion. However, the German environment is much more complicated than these models. For example, it is not clear how to take proxy voting into account. There is also the issue of the identity of the shareholder, which can affect the shareholder's role and powers. For example, bank blockholders may not be the same as nonbank blockholders with the same number of votes. Indeed, this is something that we want to test for.

To measure the degree of control rights concentration in each firm we use a Herfindahl index (see, e.g., Demsetz and Lehn, 1985; Cable, 1985). Recall that the Herfindahl index is defined as $H = \sum_{i=1}^{n} s_i$, where s_i $(i = 1, \ldots, n)$ is the fraction of stock owned by the agent i. If there are two agents, each holding 50% of the voting shares, H equals $0.5^2 + 0.5^2 = 0.5$. If there is a single agent who owns all the stock, H equals 1. The Herfindahl index is based on equity control rights, i.e., on control rights that emanate from ownership of voting stock, as discussed above. In particular, it does not include proxy votes. (Appendix B further discusses calculation of this index.)

2.4. Summary of german equity control rights structure

For the small samples, the control rights structure of each firm is measured with three variables: the banks' fraction of control rights from equity ownership

(EB), the fraction of the votes that banks vote in proxy (VB), and the Herfindahl index of the concentration of control rights from equity ownership, H. The variable VB is measured relative to the actual presence at the annual meeting. The Herfindahl index comprises all blockholders, including banks, which enter H individually. For the large samples, VB is not available. With respect to the variables EB and H, it is important to note that, since the banks are included in the variable H, any effect we detect from the banks' control rights, EB, must be due to a channel that is different than that available to nonbank blockholders.

Proxy voting arises because German shares are generally bearer securities, and individual stockholders keep their shares at their bank. By agreement, German banks have the right to exercise proxy votes for these shareholders. Agreement is given in writing and lasts for 15 months. Shareholders can instruct the bank how to vote, if they wish, but this must be in writing. Banks do not, however, have unlimited power to vote shares held at the bank. Prior to the annual meeting, banks inform the shareholders they represent as to how they will vote at the meeting. If individual shareholders disagree with the bank, they can indicate how they want to vote by informing the bank (by mail). The bank must then adhere to these instructions. Proxy-voting rights tend to be concentrated in the largest banks due to the fact that these banks happen to have an extensive network of branches. In the late 1970s, the largest six private (i.e., non-state-owned) banks controlled about three-quarters of the voting rights of dispersed shareholders (Krümmel, 1980). The Big Three banks (Deutsche Bank, Dresdner Bank, and Commerzbank) held just under half of the deposited shares in 1988 (Deutsche Bundesbank Monthly Report, April 1989).

Banks do not actively compete for proxy votes; banks with large networks of branches simply have many customers and these customers keep their shares at the bank without special instructions. From the banks' perspective, proxy voting is a passive byproduct of retail brokerage. In a similar vein, proxy voting might be viewed as the mirror image of the firm's shareholder structure, in particular its concentration of equity control rights, H. If this held, we would not expect proxy voting to be statistically significant in our empirical analysis.

Table 2, Panel A, provides the details of bank control rights from equity ownership, bank proxy voting, and the equity control rights of nonbank blockholders for the two small samples. Table 2, Panel B, covers the large samples. The tables show that equity ownership generally gives banks (as a group) control over far less than 25% of the votes. Also, proxy voting generally provides banks (as a group) with less than 25% of the votes at annual meetings. Thus, for the largest German firms (which compose our samples), control by banks, if it exists, does not appear to depend on the sheer number of votes. This point is reinforced by the fact that, in Germany, a large fraction of public companies have a single (nonbank) shareholder who holds at least 25% of the stock.

Table 2
Bank equity control rights (control rights that emanate from banks' equity ownership), EB, banks' proxy voting rights, VB, and equity control rights concentration, H. The Herfindahl index of concentration of equity control rights, H, is calculated over all (bank and nonbank) blockholders, treating banks individually (i.e., not in an aggregated fashion). Panel A: small samples. Panel B: large samples. Note that the large samples do not have information on banks' proxy voting as measured by VB.

		1975 Sample	1986 Sample
Panel A			
(1)	Bank equity control rights, EB Mean (median)	0.08 (0)	0.13 (0)
	Standard deviation (min, max)	0.17 (0, 0.52)	0.31 (0, 2.03)
	$0.00 \leqslant EB \leqslant 0.05$	61	40
	$0.05 \leqslant EB < 0.1$	0	0
	$0.1 \leqslant EB < 0.25$	4	3
	$0.25 \leqslant EB < 0.50$	9	8
	$0.50 \leqslant EB < 0.75$	8	4
	$0.75 \leqslant EB \leqslant 1.00$	0	1
(2)	Bank proxy voting rights, VB		
	Mean (median)	0.21 (0.10)	0.23 (0.17)
	Standard deviation (min, max)	0.28 (0, 0.90)	0.24 (0, 0.89)
	$0.00 \leqslant VB \leqslant 0.05$	36	19
	$0.05 \leqslant VB < 0.1$	5	4
	$0.1 \leqslant VB < 0.25$	16	12
	$0.25 \leqslant VB < 0.50$	12	14
	$0.50 \leqslant VB < 0.75$	5	4
	$0.75 \leqslant VB \leqslant 1.00$	8	3
(3)	Equity control rights concentration, H		
	Mean (median)	0.39 (0.26)	0.41 (0.28)
	Standard deviation (min, max)	0.34 (0, 1)	0.34 (0, 1)
(4)	Blockholders		
	Number of firms with a block of		
	at least 25% of control rights	68	46
	at least 50% of control rights	38	25
	at least 75% of control rights	20	15
(5)	Sample size		
	Total number of firms	82	56
Panel B			
(1)	Bank equity control rights, EB		
	Mean (median)	0.09 (0)	0.08 (0)
	Standard deviation (min, max)	0.19 (0, 1.10)	0.20 (0, 2.03)
	$0.00 \leqslant EB \leqslant 0.05$	208	223
	$0.05 \leqslant EB < 0.1$	1	0
	$0.1 \leqslant EB < 0.25$	7	15
	$0.25 \leqslant EB < 0.50$	41	23
	$0.50 \leqslant EB < 0.75$	21	17
	$0.75 \leqslant EB \leqslant 1.00$	5	2

Table 2 (*continued*)

		1975 Sample	1986 Sample
(2)	Equity control rights concentration, H		
	Mean (median)	0.34 (0.26)	0.40 (0.32)
	Standard deviation (min, max)	0.26 (0, 1)	0.29 (0, 1)
(3)	Blockholders		
	Number of firms with a block of		
	at least 25% of control rights	264	249
	at least 50% of control rights	163	172
	at least 75% of control rights	61	79
(4)	Sample size		
	Total number of firms	283	280

Our samples illustrate the importance of nonbank blockholders: 68 (264) out of 82 (283) firms in the small (large) 1975 sample have blockholders holding at least 25%; for the small (large) 1986 sample it is 46 (249) out of 56 (280). The pervasiveness of nonbank blockholders is not an aberration of our samples. Franks and Mayer (2000) study a sample of 171 German companies during the late 1980s and find that in 85% of these companies there is a single shareholder who holds at least 25%. Also, Edwards and Fischer (1994) report that "the vast majority of German AGs have a single shareholder who owns 25 percent or more of the voting capital" (p. 194). In contrast, a survey of exchange-listed firms in the U.S. in 1984 shows that only 20% of the firms have at least one nonofficer who owned 10% of firm stock; 13% of the firms are majority owned (Holderness and Sheehan, 1988). In the U.K. the proportion of public limited companies with a majority shareholder is also far smaller than in Germany (Edwards and Fischer, 1994).

2.5. Voting restrictions

The voting rights of shareholders can be restricted by an AG's charter (articles of association) not to exceed some fraction of the total votes issued by the firm, regardless of the fraction of voting shares owned. Typical restrictions are 5% or 10%. Table 3 lists the firms and voting restrictions from our samples, also showing the year the restriction was adopted. (Most voting restrictions were adopted in the 1970s when Middle Eastern countries were looking for investment opportunities for their oil dollars and started to acquire stakes in German companies.) Clearly, this type of restriction constrains the power of block shareholders, including bank blockholders. Note, however, that banks' proxy voting of dispersed shareholders' votes is not bound by this restriction, with Volkswagen AG being the only exception to this rule (Körber, 1989, pp. 97–98). These restrictions potentially make banks more powerful than nonbank

Table 3
Voting restrictions, by company, by type, and by year they were adopted. Voting restrictions limit the number of votes that each owner of voting stock is allowed to exercise at the annual shareholder meeting. Most voting restrictions are based on a fraction of votes in the total votes issued by the firm, while others are based on an absolute number of votes. With the exception of Volkswagen AG, voting restrictions do not apply to votes that banks exercise in proxy for small shareholders. Source: Verlag Hoppenstedt, *Saling Aktienführer*, various issues, Darmstadt.

Company with voting restriction	Type of restriction	Year introduced
Antriebstechnik G. Bauknecht AG	10%	1986
ASKO Deutsche Kaufhaus AG	5%	1977
AVA Allgemeine Handelsgesellschaft der Verbraucher AG	1%	1986
BASF AG	80 million Deutsche Marks of equity (face value)	1975
Bayer AG	5%	1975
Continental Gummiwerke AG	5%	1984
Hoesch AG	15%	1977
Industrie-Werke Karlsruhe Augsburg AG	10%	1985
Leifheit AG	10%	1985
Linde AG	10%	1973
Mannesmann AG	5%	1975
Rosenthal AG	5%	1986
Schering AG	12 million Deutsche Marks of equity (face value)	1973
Volkswagenwerk AG	2%/20%	1960/1970

shareholders and, consequently, it is not surprising that banks have supported these restrictions, though management has always initiated them (Edwards and Fischer, 1994).

Note that we do not expect the dummy variable for the presence of a voting restriction to be significant. If the firm's shareholder structure, along with bank proxy voting, explains the presence of a restriction, then it should have no separate, significant effect. As is possible with bank proxy voting, a voting restriction might simply be the mirror image of the firm's shareholder structure. This argument holds even in the case that the firm's shareholder structure (and the extent of proxy voting) changed in response to the adoption of a voting restriction.

2.6. Firm performance measures

For performance measures we use an accounting measure of profitability, the return on equity (ROE), and a market-based measure, the (log of the) market-to-book ratio (MTB). Accounting measures of firm performance have been widely used by other researchers, e.g., Demsetz and Lehn (1985), though in our

case we rely on German accounting. Harris et al. (1994) find that the relation between 18-month stock returns and annual earnings for large German firms over the period 1982–1991 is basically the same as in the U.S. The market-to-book ratio is essentially Tobin's Q. While we do not construct estimates of the replacement costs of fixed assets or adjust for taxes, Perfect and Wiles (1994) show that these adjustments are not significant. For the large samples, the numbers of firms we use for the MTB and ROE regressions are the same. For the small samples, the number of firms in the MTB regressions is lower than in the ROE regressions because not all firms are traded.

Details on German accounting rules can be found in Coenenberg (1974, 1993) and Ordelheide and Pfaff (1994). We calculate the book value of equity as the sum of the face value of equity (including equity-like certificates), reserves, profits, and special reserves. The market-to-book ratio of equity, MTB, equals the 1976 (1987) year-end market value of equity (aggregated over all categories of stock) divided by the 1976 (1987) year-end book value of equity. (We linearly interpolate the book value of equity for the firms with other than calendar fiscal years.) The return on equity, ROE, equals the surplus of the year 1976 (1987), divided by the book value of equity, averaged over fiscal year-ends 1976 and 1977 (1987 and 1988). Surplus of the year equals net profits plus payments to minority shareholders and the parent firm less any income obtained from the parent firm to cover losses. The book value of total assets is the sum of equity, provisions, and debt.

We also want to control for other exogenous characteristics of the sample firms that can affect performance. The following additional variables are included unless otherwise indicated: a codetermination dummy variable (Co) that equals one if there is equal representation, and zero otherwise; a voting restriction dummy variable (VR) that equals one if there is a voting restriction, and zero otherwise; a state ownership dummy variable (Go) that equals one if a majority of the voting shares are controlled by government entities, and zero otherwise; (log of) total assets (TA); and an industry dummy for industry j (ISIC j) based on the International Standard Industrial Classification (United Nations, 1990). We also include a dummy variable for the year 1986; this absorbs the change in the price deflator, which means that we do not have to deflate total assets.

3. German banks and corporate control: hypotheses

In addition to measurement issues, there is the problem of specifying the link between firm performance and measures of equity control rights. The lack of theoretical guidance about this link motivates our empirical approach. In this section, we provide an overview of our approach and specify broad hypotheses to be examined.

3.1. Overview

We focus on how firm performance varies in cross-section as a function of (i) which fraction of the firm's votes is controlled by banks via equity ownership, EB, (ii) how much of the firm's equity banks vote in proxy, VB, (iii) the extent to which there are nonbank block shareholders, H, (iv) the degree to which the firm is subject to codetermination, Co, (v) the presence of voting restrictions, VR, and (vi) other factors (normalizing regressors) that capture characteristics of the firm that can affect performance.

We want to relate the ownership structure variables and the other independent variables to measures of firm performance. Let (EB_i, VB_i, H_i) be a vector of observations of the equity control variables of firm i; and let $\boldsymbol{X}_i$ be a (row) vector that represents Co_i, VR_i, and the observations from the set of normalizing regressors. Let P_i be a measure of firm performance, either return on equity, ROE, or the (log of the) market-to-book ratio, MTB. For the reasons discussed above, we do not know how firm performance is affected by our three equity control variables, EB, VB, and H. Consequently, we initially investigate the performance of firm i $(i = 1, \ldots, n)$ in the following semiparametric form:

$$P_i = \boldsymbol{X}_i\beta + f(EB_i, VB_i, H_i) + \varepsilon_i, \tag{1}$$

where $f(\cdot)$ is an unknown, possibly nonlinear, smooth function, but where the relation between $\boldsymbol{X}_i$ and performance is a (known) parametric function and ε_i is a mean-zero error term with variance σ^2. Based on specification tests using estimates of Eq. (1) we go on to parametric specifications.

The specification in Eq. (1) takes the equity ownership structure of firms as exogenous, reflecting the fact that we are studying an economy in which the stock market plays a much smaller role than in economies such as the U.S. or U.K. With a thin stock market, it is difficult for blockholders to assemble blocks in firms that they believe will do well in the future. Thus, we are proceeding under the view that Eq. (1) captures a potentially causal relation, e.g., bank block ownership causes firm performance according to the function specified. This view will be quite alien to those used to thinking about stock-market-based economies. To buttress our view, we document below that the equity ownership structures change little through time. There is little evidence that block positions respond to information about prospective firm performance. Eq. (1) also assumes that the firm's capital structure, the amount of bank borrowing, the amounts of retained earnings (i.e., dividend policy), and the composition of corporate boards are endogenous. These variables are at least partly determined by the same independent variables that determine P_i. (We discuss this further when we analyze the determinants of firm board composition.)

The specification in Eq. (1) treats banks in an aggregate fashion, that is, bank control rights from equity ownership and bank voting rights are each added up across banks. There are two reasons for this. First, empirically it is the case that

there is usually a single bank that is the dominant bank equity holder for firms in which banks are important owners. This is related to the fact that equity ownership and proxy voting are concentrated in the largest banks. Second, the large banks, as a group, control a majority of votes at their own annual meetings (Gottschalk, 1988), strongly suggesting the possibility of collusion.

We now turn to discussing some hypotheses.

3.2. Bank equity ownership and firm performance

From Table 2 it might appear that bank equity holding is unimportant because nonbank blockholders are much more pervasive than bank blockholders. Bank control rights from equity ownership, in general, seem low. But the conclusion that banks are not important would be premature. First, as discussed above, there can be voting restrictions in place, allowing banks to outvote large nonbank blockholders using proxy votes. Second, and perhaps more importantly, the power to exercise corporate control is not only a function of the allocation of formal control rights in the form of votes. Banks can have superior power and information that they use to their advantage even if their control rights are low in number and there is a large nonbank blockholder. Banks can also have superior information by virtue of the lending relationship (Elsas and Krahnen, 1998). In addition, as mentioned above, banks have power because they guard access to capital markets.

If banks can affect firm performance by virtue of having control rights that emanate from equity ownership, then there are three possibilities for how firm performance could be altered. First, if there is a coincidence of interests between banks and other shareholders, then banks can be benign or even improve performance. While banks' control-rights-derived power can give them the ability to expropriate from other shareholders, banks might not have the economic incentive to behave this way. Bank cash-flow rights can be highly correlated with control rights from equity ownership, the effect emphasized by Jensen and Meckling (1976), resulting in a coincidence of interests. In fact, while nonbank blockholders can improve firm performance to the extent that they hold control rights and cash-flow rights, banks are better able to improve firm performance than nonbank blockholders. In other words, what we will call the "coincidence-of-interests hypothesis" states that over the entire range of bank ownership of voting stock, the relationship between firm performance and the fraction of bank equity control rights is upward sloping, ceteris paribus.

A second possibility, maintained by strong critics of universal banking, is that the interests of bank equity holders and other shareholders are in opposition to each other, no matter how many votes the banks control via share ownership. Banks act in their own private interests to the detriment of other shareholders. For this hypothesis to hold, banks must have private benefits at stake, so that when the banks' block increases, they use the additional control rights to extract

more private benefits. For example, by virtue of their dual role as lenders and equity holders, and to the extent that capital markets are not a very competitive financing option, banks can behave as monopolists, using their power to extract profit from the firm at the expense of firm performance. The view that German banks act as monopolists to the detriment of firm value is a long-standing criticism. Even the Deutsche Bundesbank disingenuously notes:

> When enterprises are deciding on which financing methods to adopt, the advice of their principal bankers may sometimes be to take up new loans, because the share issue which might be to the advantage of the enterprise is not rated so highly by the bank; however, definite statements in this regard can neither be made nor proved. (Monthly Report, April 1984, p. 15)

For example, monopoly profits can be extracted by increased borrowing from the bank, possibly at monopoly interest rates.

Finally, the relation between firm performance and the fraction of voting rights that banks control via equity ownership could be downward sloping over some initial range of bank equity ownership, and then upward sloping, ceteris paribus. That is, the bank faces a tradeoff between its private benefits and the value of its shares depending on its ability to extract private benefits. Such a tradeoff can depend on the size of the bank's equity stake. Holding other variables constant, a bank can face a conflict of interest over a low range of low equity holding, but not when its equity holding is high. In the case of such a conflict of interest, the relation between firm performance and bank equity control rights is nonlinear: firm performance can initially decline with an increase in the amount of control that is associated with an increase in bank equity ownership; when bank equity ownership and the corresponding fraction of equity control rights are large, firm performance rises with bank equity ownership.

The three descriptions of possible relations between firm performance and bank control rights from equity ownership are those that hold whenever there is a potentially informed insider blockholder in a system with one share, one vote. These are the hypotheses explored for U.S. managers' stockholdings by, for example, Morck et al. (1988), and McConnell and Servaes (1990), and for banks by Gorton and Rosen (1995). The only difference here is that the bank can be potentially more informed and more powerful than managers and the bank can have more private benefits at stake. More important, however, are the interactions of the other characteristics of the governance system with bank control rights that emanate from ownership in voting stock. We now turn to these other characteristics.

3.3. Proxy voting and conflicts of interest

A clear (at least formal) break between the alignment of control rights and cash-flow rights is in the ability of German banks to vote shares in proxy. This

raises the prospect that banks vote in their private interests rather than in the interests of shareholders. Clearly, proxy-voting power is potentially important because the votes of dispersed shareholders are concentrated in banks. These votes can be used when important decisions are made at the general meeting. In particular, membership on the supervisory board is determined by elections at the general meeting. (By law, AGs must hold a shareholder meeting at least once a year.) Also, as discussed above, blockholders' voting power can be limited by voting restrictions, which increases the importance of bank proxy voting. Thus, proxy voting by banks, which creates a concentration of voting power, would seem to generate the clearest possibility of a conflict of interest and, for this reason, has been very controversial in Germany.

Proxy voting gives banks control rights in excess of cash-flow rights. If proxy voting affects firm performance, then the possibilities for how banks use their proxy votes are the same as for the banks' control rights from equity ownership, which we discussed above. In the case of a coincidence of interests between banks and other shareholders or, in the opposite case, when interests are always in opposition to each other, an appropriate measure of bank control rights would be one for which proxy-voting rights add to the control rights from equity ownership. But how the excess control rights are used might depend on the level of the bank's cash-flow rights. That is, it could be that with low amounts of equity ownership the bank uses the proxy votes to enforce decisions in its private interests, while at high levels of equity holdings the bank uses proxy votes to maximize the value of the firm. In this case, there would be a critical value of bank control rights from equity ownership such that performance is increasing in bank proxy rights above this level and decreasing below it. In other words, there would be a critical fraction of bank equity control rights, EB^*, such that, holding everything else constant, $\partial P/\partial VB > 0$ for $EB > EB^*$ and $\partial P/\partial VB < 0$ for $EB \leqslant EB^*$.

Alternatively, bank proxy-voting rights might simply be the flip side of the firm's equity control structure, in particular, its concentration, H. In this case, proxy voting is endogenous and therefore should have no impact of its own.

3.4. Nonbank block shareholders

In stock market economies, outside block shareholders are often viewed as monitors of firm management because, by virtue of the size of their stake in the firm, they have an incentive to actively oversee management. Implicit in this view is a close link between control rights and cash-flow rights. In stock market economies, dispersed small shareholders can face free-rider problems in monitoring firm management if monitoring is costly (Grossman and Hart, 1980; Shleifer and Vishny, 1986). The empirical evidence for the U.S., while somewhat mixed, appears to support the importance of large shareholders in increasing

firm value.[2] The potential behavior of banks, outlined above, can interact with the behavior of nonbank blockholders, but there are several possibilities for this interaction.

Since, as mentioned above, a very high percentage of the largest quoted German companies have a single shareholder owning at least 25% of the shares, the monitoring role of blockholders might be very important in Germany and might explain why hostile takeovers are not necessary and hence are rare. Nonbank blockholders might be so powerful that they not only monitor firms' management but also monitor banks, preventing banks from falling prey to their conflicts of interest. On one hand, nonbank blockholders can behave as insiders, reducing firm performance over a range of low equity holdings by extracting private benefits but then improving firm performance when their equity holdings are high. Perhaps banks attempt to monitor the deleterious behavior of these blockholders. On the other hand, banks can collude with large blockholders. Basically, a number of (nonlinear) interactions with the bank ownership of voting rights and proxy voting are plausible. These considerations suggest the importance of controlling for the entire equity voting structure of the firm in attempting to detect the effects of banks on performance and further emphasize the importance of the econometric specification issue.

3.5. *Equity voting restrictions*

Voting restrictions delink control rights and cash-flow rights at the restriction point. Such voting restrictions potentially increase the power of bank proxy voting. Voting restrictions can also limit the size of nonbank blockholders and hence increase the power of banks, whether it emanates from votes or from other sources. As discussed below, however, it is likely that voting restrictions are endogenous, that is, they are a function of the equity ownership structure and hence should have no separate effect.

3.6. *Codetermination*

Corporate governance and firm performance in Germany can be influenced by the fact that, under German law, employees of large firms are allocated (voting) seats on the supervisory board. In Germany, the board system consists of the supervisory board (Aufsichtsrat) and the management board (Vorstand). The role of the supervisory board is to oversee the management board; it has the power to hire and fire, set compensation, regularly meet with management, and so on. Basically, the management board runs the day-to-day operations and is

[2] See Demsetz and Lehn (1985), Mikkelson and Ruback (1985), Holderness and Sheehan (1988), Barclay and Holderness (1991), and Zeckhauser and Pound (1990).

responsible to the supervisory board. According to German codetermination laws, employees must constitute either one-half or one-third of the firm's supervisory board, depending on the size of the firm. Some firms are not required to have employees on the supervisory board. Codetermination implies that a sizable fraction of the nonexecutive directors cannot be appointed by shareholders, even if a single shareholder would effectively be in control otherwise. This uncouples control rights and cash-flow rights, which makes codetermination potentially important to the extent that the supervisory board controls the important decision-making of the firm.

There are three different forms of codetermination in Germany (see Wiedemann, 1980; Gorton and Schmid, 1998, for details). First, there is codetermination in the coal and steel industry (Montan-codetermination). It was introduced in 1951 and requires equal representation between employees and shareholders on the supervisory board. There is also a so-called neutral member on the supervisory board, to break ties. Second, the Codetermination Act of 1976 extended equal representation (with modifications) to all other industries, leaving Montan-codetermination in place. This law requires that if the corporation has regularly more than 2000 employees, then the employees must elect one-half of the supervisory board members. Typically, about one-third of the employee representatives are members of the works council while the remainder consists of external trade union representatives. Even though half the seats go to workers, representation under the 1976 Codetermination Act is not quite equal because the chair, appointed by the shareholders, has an extra vote. Also, at least one employee representative must be elected from the senior managers. Third, under the Works Constitution Act of 1952, one-third employee representation is required of companies with 500 to 2000 employees.

The effects of codetermination on the performance of a firm are potentially quite complicated. It could be that codetermination affects only the distribution of the firms' cash flows, but not its amount. That is, employees use their power on the supervisory board to bargain for a greater share of the firm's cash flows, but have no other effects. Whether employees have enough power to do this depends on whether other institutions, perhaps banks, can counteract such power. This is an empirical question. But codetermination can have other effects as well. If employees are risk averse and have firm-specific human capital at stake, then they can use their power on the supervisory board to alter the firm's investment and operating decisions in favor of reducing idiosyncratic firm risk. Furthermore, it could simply be the case that employees make poor decisions and hence reduce firm performance. Gorton and Schmid (1998) empirically explore many of these issues. Here, we limit ourselves to the question of whether codetermination is detrimental to firm value by taking account of cross-section variation in codetermination. Note that we account for the 1976 Codetermination Act in our 1975 samples because our firm performance measures are taken from the fiscal year 1977.

3.7. The exogeneity of the equity ownership structure

The specification in Eq. (1) assumes that the equity ownership structure and, in particular, bank blockholding, is exogenous or at least predetermined with respect to firm performance. When the stock market is not the dominant institution for organizing the savings–investment process, it is difficult for agents to alter their portfolios. By definition, illiquidity is a central feature of a bank-based economy and the exogeneity of the ownership structure flows from this fact. It is precisely this relative illiquidity that makes bank-based economies different from stock-market-based economies. But exactly how illiquid are the stock markets in bank-based economies? Our main focus, however, is not on empirically examining the relative liquidity of the German stock market (though that seems like an interesting question). Our interest is whether banks are active equity portfolio managers, buying stock in undervalued firms and selling blocks in overvalued firms. To address this question with respect to banks we examine how banks acquire their equity positions and how these positions change through time. The basic point is that German banks are not actively managing equity portfolios, which would imply the existence of a liquid stock market.

Typically, banks acquire blocks of shares as byproducts of banking relationships; blocks are purchased from families or during distress. The Deutsche Bundesbank reports:

> German banks originally acquired part of their shareholdings … via special transactions or through "rescue operations" for enterprises which had got into liquidity difficulties. Portfolio considerations alone never tip the scales when banks are contemplating the purchase of equities … (Monthly Report of the Deutsche Bundesbank, April 1984, p. 16).

"Special transactions" refer to purchases of blocks from family owners who are selling out.[3] For details on block trades in Germany see Franks and Mayer (2000).

Besides the illiquidity of the stock market, there are strong tax incentives for not selling blocks of equity that, possibly due to active monitoring of bank blockholders, have appreciated over time. Capital gains are not taxed before being realized through sale. Capital gains from block sales are subject to the full

[3] Studienkommission (1979, p. 87) reports that 559 of the 662 bank equity participations observed at the end of 1974 (they sent out a questionnaire and only considered cases where 10% or more was held) were acquired after the year 1948. Most of these holdings were acquired after 1960. Herrhausen (1987, p. 107, Table 3) presents some information on why banks hold equity. He considers 20 acquisitions of the ten largest private banks that took place in the period 1976–1986. Only seven of these companies were traded at the stock exchange at this time. The reasons mentioned by these banks were: long-term investment (six cases), short-term investment (five cases), support of medium sized companies which are weakly endowed with capital (five cases), credit rescue measure (one case), anti-takeover measure (one case), and other reasons (two cases).

Table 4
Share ownership in nonfinancial firms of the largest German banks, the Big Three, for the period 1972–1990. The table is in favor of our assumption that in Germany, holdings of large blocks (by banks in particular) show a sufficient degree of persistence to be treated as an exogenous variable in our empirical analysis. The addendum i stands for indirect ownership as defined by Böhm (1992), our data source. Note that his definition of indirect ownership complies only roughly with our concept of ultimate owners. Panel A: Deutsche Bank AG. Panel B: Dresdner Bank AG. Panel C: Commerzbank AG. Source: Böhm (1992).

Year	1972	1975	1978	1980	1982	1984	1986	1988	1990
Panel A									
Stock Corporations									
AEG AG	0	0	0	0	0	> 5	16 i	16 i	22.5 i
Bergmann Elektrizitätswerke AG	> 25	> 25	> 25	> 25	> 25	> 25	36.5	36.5	36.5
Continental AG	10 i	10 i	10	10	10	10	10	10	10
Daimler Benz AG	> 25	> 25	28.5	28.5	28.5	28.5	28.1	28.2	28.1
Hapag Lloyd AG	> 25	> 25	> 25	> 25	> 25	> 25	> 25	12.5	12.5
Philipp Holzmann AG	> 25	> 25	> 25	> 25	> 35	> 35	> 25	35.4	30
Horten AG	18.8 i	18.8 i	18.8 i	18.8 i	18.8 i	18.8 i	18.8 i	18.8 i	18.8 i
Karstadt AG	> 25	> 25	> 25	> 25	> 25	> 25	> 25	> 25	> 25
Klöckner-Humboldt-Deutz AG	0	0	0	0	0	0	0	41.5 i	41.1 i
Klöckner Werke AG	0	0	0	0	0	0	0	19.6 i	0
Linde AG	0	0	0	0	0	0	0	10	10
Metallgesellschaft AG	8.3 i	8.3 i	8.3 i	13.1 i	8.8 i	8.8 i	10.6 i	10.7 i	10.1 i
Nixdorf AG	0	0	0	0	25	0	0	0	0
VEW AG	6.3 i	6.3 i	6.3 i	6.3 i	6.3 i	6.3 i	6.3 i	6.3 i	6.3 i
Firms of other legal forms									
MBB GmbH	0	0	0	0	0	0	0	0	17.7
MTU GmbH	0	0	14.3 i	14.3 i	14.3 i	14.3 i	28.1 i	28.2 i	28 i
Panel B									
Stock Corporations									
AEG AG	0	0	0	0	0	> 5	0	0	0
Bayerische Motoren Werke AG	0	0	0	0	0	5 i	5 i	5 i	5 i

Bilfinger und Berger AG	> 50	44	44	> 25	> 25	> 25	> 25	> 25	25
Continental AG	0	0	0	0	0	0	0	0	7.7
Degussa AG	10 i	10 i	10 i	10 i	10 i	10 i	10 i	10 i	10 i
FAG Kugelfischer KGaA	0	0	0	0	0	> 10	0	0	0
Hapag Lloyd AG	> 25	> 25	> 25	> 25	> 25	> 25	> 25	12.5	12.5
Kaufhof AG	> 25	> 25	> 25	> 25	9	9	9	0	0
Metallgesellschaft AG	> 25	> 25	25	30	33	16.5 i	18 i	23.1 i	23.3 i
Firms of other legal forms									
MBB GmbH	0	0	0	0	0	5 i	5 i	5 i	5 i
Panel C									
Stock Corporations									
FAG Kugelfischer AG	0	0	0	0	0	> 10	0	0	0
Hochtief AG	> 25	> 25	25	12.5 i	12.5 i	12.5 i	12.5 i	12.5 i	12.5 i
Philipp Holzmann AG	0	0	0	0	5	> 7.5 i	> 7.5 i	5 i	> 7.5 i
Horten AG	6.3 i	6.3 i	7.3 i	6.3 i	6.3 i	6.3 i	6.3 i	6.3	6.3
Karstadt AG	> 25	> 25	> 25	> 25	> 25	> 25	> 25	> 25	> 25
Kaufhof AG	> 25	> 25	> 25	> 25	0	0	0	0	0
Linde AG	0	0	0	10	10	10	10	10	10
MAN AG	0	7.5 i	7.5 i	7.5 i	6.2 i	6.2 i	7.5 i	7.5 i	7.5 i
Sachs AG	0	0	25	25	> 25	> 25	> 35	0	0
Firms of other legal forms									
Thyssen AG	0	0	0	0	0	0	5 i	5 i	5 i

corporate tax rate, which gives blocholders an incentive to hold on to their equity stakes. (At the end of the year 1999, the German government revealed plans to lower the tax rate that applies to realized capital gains from block trades, in an attempt to lower the transaction costs of equity control changes and encourage corporate restructuring.)

As a result of the illiquidity of the stock market and the tax incentives, it is notsurprising that German equity ownership structures tend not to change much through time. In particular, the block ownership of firms by banks is persistent. Table 4 details the ownership shares in some large companies by the Big Three, Deutsche Bank (Panel A), Dresdner Bank (Panel B), and Commerzbank (Panel C). The table covers the period 1972–1990. (Recall that our samples are drawn from 1975 and 1986.) While there is some change in equity ownership, the main feature is the persistence of block size over the period.

The illiquidity of equity, and bank blocks in particular, is potentially important for the German system of corporate governance. A number of researchers, including Maug (1998), Kahn and Winton (1998), and Admati et al. (1994), explore the choice of block size and the behavior of the blockholders, viewing blockholders as (possibly risk-averse) monitors of firms (also see Bhide, 1993). A blockholder can monitor management and in the process become privately informed about the firm. Such a blockholder faces a decision concerning whether to trade on this private information or continue as a blockholder. In an economy with a liquid stock market, a blockholder faces a number of these types of decisions. But in an economy where the stock market is less liquid, or simply illiquid, such tradeoffs do not occur. Blockholders, especially banks, can be forced to try to maintain or improve the value of blocks, as monitors of the firm's management, because the alternative of selling the blocks is not available.

4. Econometric methodology

As discussed above, a number of hypotheses involve nonlinearities between firm performance, bank control rights from equity ownership, EB, bank proxy voting, VB, and equity control rights concentration, H, while other hypotheses imply monotonic relations. Since the shape of Eq. (1) is critical to our investigation, our approach is to start by using a semiparametric estimation procedure to search for nonlinearities. We want to allow the data to dictate the functional form so we avoid having to arbitrarily specify a parametric form for Eq. (1). We test for the appropriate semiparametric specification (i.e., "window size", as discussed below) but also include some parametric functions as potential candidates. Our strategy is to try to impose structure on Eq. (1) in a step-by-step fashion, starting from as little structure as possible and proceeding by letting the data guide us, possibly to a parametric form.

4.1. Semiparametric estimation: overview

Eq. (1) consists of a parametric part (the term $\boldsymbol{X}\beta$) and a nonparametric part, the function $\boldsymbol{f}(\cdot)$. We want to allow full generality as to the possible shape of $\boldsymbol{f}(\cdot)$. Estimation of Eq. (1) and inference are complicated by the combination of the parametric component with the nonparametric, smooth component. We follow a procedure proposed by Speckman (1988). The basic approach is to purge each component of dependence on the other component and then apply ordinary least squares to the parametric part and a (linear) smoother to the nonparametric part. Consequently, we start by defining

$$\boldsymbol{X}^* = (\boldsymbol{I} - \boldsymbol{K})\boldsymbol{X} \tag{2}$$

and

$$\boldsymbol{P}^* = (\boldsymbol{I} - \boldsymbol{K})\boldsymbol{P}. \tag{3}$$

These are the variables $\boldsymbol{X}$ and $\boldsymbol{P}$, "adjusted" for dependence on $\boldsymbol{EB}$, $\boldsymbol{VB}$, and $\boldsymbol{H}$, via the smoother matrix $\boldsymbol{K}$. ($\boldsymbol{I}$ is the identity matrix.) Then β is estimated by

$$\hat{\beta} = (\boldsymbol{X}^{*\prime}\boldsymbol{X}^*)^{-1}\boldsymbol{X}^{*\prime}\boldsymbol{P}^* \tag{4}$$

and the estimate of the nonparametric part reads

$$\hat{\boldsymbol{f}} = \boldsymbol{K}\cdot(\boldsymbol{P} - \boldsymbol{X}\hat{\beta}). \tag{5}$$

With regard to the choice of $\boldsymbol{K}$, we use (quadratic) locally weighted regression, LOESS (Cleveland and Devlin, 1988; Müller, 1987; Stute, 1984; Cleveland, 1979). The advantage of LOESS over kernel methods is that it can handle multidimensional smoothing with fairly small data sets. LOESS can not only account for possible nonlinear effects the variables EB, VB, and H, might have in isolation. LOESS can also control for possible interactions among these three explanatory variables as they affect firm performance. Such interaction effects would, for example, be observed if banks fell prey to their conflicts of interest.

4.2. Specification testing: the M-statistic

While locally weighted regression does not require a functional form to be specified, it does require that a smoothing parameter, g, be chosen. Based on Mallows' (1973) C_p criterion, Cleveland and Devlin (1988) developed a method that offers some guidance in the choice of this smoothing parameter. We outline this procedure in the following.

Let $\boldsymbol{z}_i$ be the triplet $\{\boldsymbol{EB}_i, \boldsymbol{VB}_i, \boldsymbol{H}_i\}$ for firm i. The function $f(\cdot)$ at point $\boldsymbol{z}_i$ is estimated using the q nearest neighbors of this data point. The smoothing parameter g is the fraction of the q nearest neighbors in the number of observations in the sample, i.e., $g = q/n$. Thus, the estimate, $\hat{f}_g(\boldsymbol{z}_i)$ depends on g, as does its mean squared error.

The expected mean squared error summed over z_i, $i = 1, \ldots, n$, and divided by σ^2 is

$$M_g = \frac{E\sum_{i=1}^{n}(\hat{f}_g(z_i) - f(z_i))^2}{\sigma^2}. \tag{6}$$

Eq. (6) shows how the choice of the smoothing parameter, g, trades off variance of the estimator against bias. For a sufficiently small value of the smoothing parameter, $g = g_o$, the bias of $\hat{f}_g(z_i)$ is negligible, resulting in a nearly unbiased estimate of σ^2. Let s^2 be an estimate of σ^2 for the smoothing parameter g_o. Also, let

$$B_g = \frac{\boldsymbol{e}_g'\boldsymbol{e}_g}{s^2} - \mathrm{tr}(\boldsymbol{I} - \boldsymbol{K}_g)'(\boldsymbol{I} - \boldsymbol{K}_g) \tag{7}$$

and

$$V_g = \mathrm{tr}\, \boldsymbol{K}_g'\boldsymbol{K}_g, \tag{8}$$

where $\boldsymbol{e}_g$ is the vector of residuals obtained when the smoothing parameter g is employed. The subscript g on $\boldsymbol{K}$ indicates the dependence of the smoother on g. The expected mean squared error, M_g, can be estimated by

$$\hat{M}_g = \hat{B}_g + V_g. \tag{9}$$

$\hat{B}_g$ is the contribution of bias to the estimated mean squared error and V_g is the contribution of variance. When $\hat{f}_g(\cdot)$ is a nearly unbiased estimate, then the expected value of $\hat{B}_g$ is nearly zero, so the expected value of $\hat{M}_g$ is nearly V_g. As g increases, bias is introduced, and $\hat{B}_g$ has a positive expected value, so the expected value of $\hat{M}_g$ exceeds V_g.

V_g is called the equivalent number of parameters of the fit by analogy with the Mallows (1973) C_p statistic. The equivalent number of parameter decreases as the smoothing parameter, g, increases, i.e., more structure is imposed. Cleveland and Devlin (1988) show that the distribution of $\hat{M}_g$, the M-statistic, is (approximately) an F distribution under the assumption of no bias. Cleveland and Devlin (1988) describe the degrees of freedom and Cleveland et al. (1988) describe Monte Carlo studies of the approximation. Using this result, we can calculate the distribution of the M-statistic for any $g \geqslant g_0$ under the null hypothesis of no bias. We will convey this information with a graph of $\hat{M}_g$ against V_g, the equivalent number of parameters. The plots will also show the 90% confidence intervals.

We plot the M-statistic for our semiparametric specification over a range of smoothing parameters, g, and for two parametric specifications. We are interested in specifications for which bias is negligible. The M-statistic does not directly test one specification against another (i.e., it is not directional), but this serves

our purposes because we are not testing against a particular alternative hypothesis. Whang and Andrews (1993) discuss directional tests in the semiparametric context.

5. The effects of banks on firm performance

In this section we estimate the performance relation in Eq. (1) and draw inferences about some of the hypotheses outlined above. We first address the issue of the shape of Eq. (1). If we detect nonlinearities, then, depending on the details of the nonlinearity, this could be evidence in favor of one of the conflicts-of-interest hypotheses. That is, there could be ranges of equity control rights over which there is a detectable effect on performance of the uncoupling of cash-flow rights and control rights. If there are such nonlinearities, it will rule out the straightforward monotonic hypotheses that banks have either coincident or opposing interests over all ranges of the firms' multidimensional control rights structures.

Based on the results concerning the shape of Eq. (1), the analysis proceeds by estimating a parametric specification, addressing the question of which equity control rights variables, EB, VB, or H, affect firm performance. We then analyze changes in German corporate governance between 1975 and 1986 and compare our results to Cable (1985).

5.1. The shape of the performance–ownership structure relation with proxy voting

We start by focusing on the small samples because they contain proxy-voting measures. The issue of conflicts of interest seems most important here and therefore, the issue of nonlinearities is most critical.

Fig. 2 is an M-plot for the market-to-book ratio for the small 1975 sample from $g = 0.65$ to $g = 1.0$, with steps of 0.05. (Since our data sets are small, we start out with a fairly high smoothing parameter to avoid the problem of overfitting.) In the figure, the rightmost $\times$-symbol is for $g = 0.65$, which increases from right to left (because V_g decreases) until we come to the leftmost $\times$-symbol. We also include two parametric specifications: quadratic (i.e., including squared and cross-terms of EB, VB, and H) and linear (without such terms). The leftmost box symbol is the linear specification; the other box is the quadratic specification. In the figure, the upward-sloping line is $\hat{M}_g = V_g$, assuming no bias for the lowest value of the smoothing parameter, $g = 0.65$. The vertical lines are 90% confidence intervals. The figure shows that the quadratic and the linear parametric specifications are unbiased for the (log of the) market-to-book ratio, MTB. Fig. 3 shows the M-plot for the return on equity, ROE, for the small 1975 sample. Again, both quadratic and linear parametric specifications are acceptable in terms of bias. This conclusion means that (for the small 1975

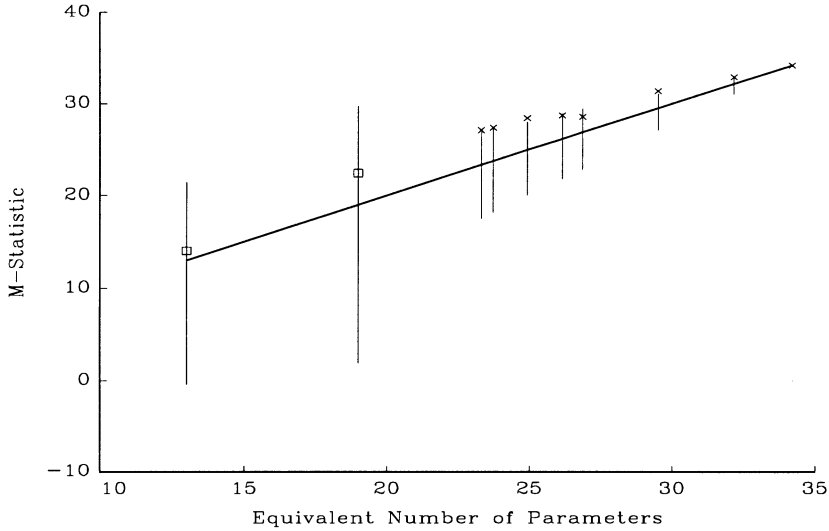

Fig. 2. M-plot for the small 1975 sample when firm performance is measured by the (log of the) market-to-book ratio of equity, MTB. The upward-sloping line is drawn under the assumption that the bias in the semiparametric estimation is negligible for the lowest value of the smoothing parameter we applied, $g = 0.65$. The $\times$-symbols represent alternative values for the smoothing parameter. The M-statistic and the equivalent number of parameters that comes with the lowest smoothing parameter is represented by the rightmost $\times$-symbol. The smoothing parameter increases in steps of 0.05 from right to left. The two box symbols represent parametric specifications; the right box stands for a quadratic least-squares specification (which includes squared and cross-terms of EB, VB, and H), while the left box is a linear least-squares specification (i.e., one without such terms). The vertical lines are 90% confidence intervals around the null hypothesis that the specification in question delivers unbiased estimates of the unknown functional form.

sample) we cannot reject the null that there are no nonlinearities; hypotheses implying such nonlinearities are not supported by the data because the relation is monotonic in all control rights variables, EB, VB, and H.

We now turn to the small 1986 sample. Figs. 4 and 5 show the M-plots for this sample. Because this sample is smaller than the 1975 sample, we start with a larger smoothing parameter. The plot begins with $g = 0.75$ and increases to $g = 1.0$ by steps of 0.05. The symbols are as in the previous plots. Note that the symbols for the quadratic and the linear parametric specifications are within the 90% confidence interval. As for the 1975 sample, this means that the data do not support the nonlinear hypotheses for the 1986 sample.

The specification tests of the large samples give similar results. (The M-plots are omitted.) Note that the large samples do not have proxy-voting data. Thus, the nonparametric part of Eq. (1) has two dimensions only (EB and H).

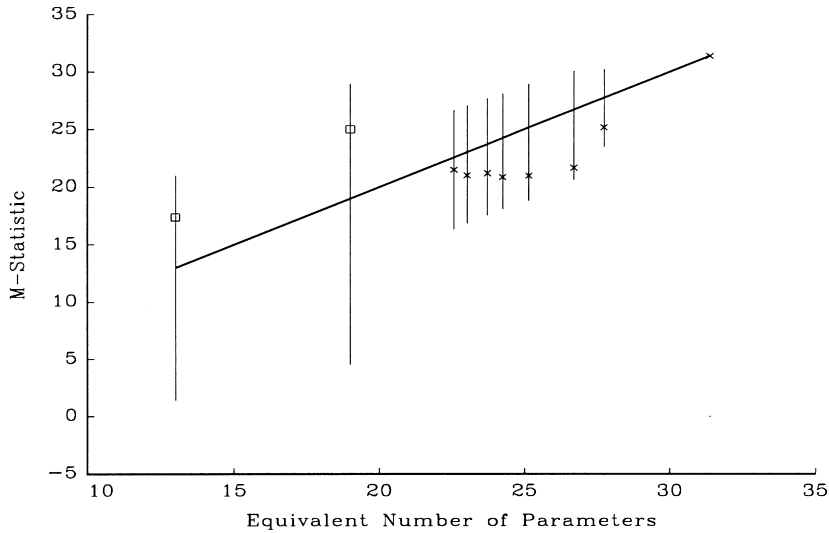

Fig. 3. M-plot for the small 1975 sample when firm performance is measured by the return on equity, ROE. The upward-sloping line is drawn under the assumption that the bias in the semiparametric estimation is negligible for the lowest value of the smoothing parameter we applied, $g = 0.65$. The $\times$-symbols represent alternative values for the smoothing parameter. The M-statistic and the equivalent number of parameters that comes with the lowest smoothing parameter is represented by the rightmost $\times$-symbol. The smoothing parameter increases in steps of 0.05 from right to left. The two box symbols represent parametric specifications; the right box stands for a quadratic least-squares specification (which includes squared and cross-terms of EB, VB, and H), while the left box is a linear least-squares specification (i.e., one without such terms). The vertical lines are 90% confidence intervals around the null hypothesis that the specification in question delivers unbiased estimates of the unknown functional form.

We find that for both performance measures, linear parametric specifications are acceptable in terms of bias. This is our first important finding. The remaining questions are whether banks affect firm performance and, if so, whether the interests of banks are in opposition to or coincident with those of other shareholders. We try to answer these questions by examining the linear parametric specification.

5.2. *Are the conflicts of interest between banks and other shareholders*?

We now present least squares performance regressions for each sample (small and large). We pool the two years, 1975 and 1986, in a single regression and test for differences across years.

Table 5 shows the results for MTB for the small sample and Table 6 shows the results for ROE for the small sample. From these tables we learn that (i) when

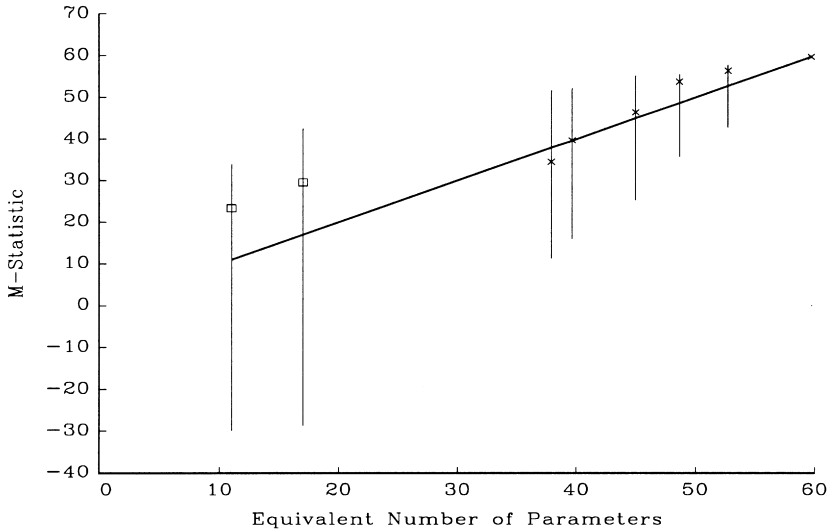

Fig. 4. M-plot for the small 1986 sample when firm performance is measured by the (log of the) market-to-book ratio of equity, MTB. The upward-sloping line is drawn under the assumption that the bias in the semiparametric estimation is negligible for the lowest value of the smoothing parameter we applied, $g = 0.75$. The $\times$-symbols represent alternative values for the smoothing parameter. The M-statistic and the equivalent number of parameters that comes with the lowest smoothing parameter is represented by the rightmost $\times$-symbol. The smoothing parameter increases in steps of 0.05 from right to left. The two box symbols represent parametric specifications; the right box stands for a quadratic least-squares specification (which includes squared and cross-terms of EB and H), while the left box is a linear least-squares specification (i.e., one without such terms). The vertical lines are 90% confidence intervals around the null hypothesis that the specification in question delivers unbiased estimates of the unknown functional form.

MTB is the performance measure, firm performance increases as a function of the banks' control rights from equity ownership, EB; (ii) firm performance is not related to bank proxy voting as measured by VB; (iii) firm performance is positively related to concentration of control rights from equity ownership, H; (iv) when ROE is the performance measure, firm performance decreases with codetermination.

The results using the large samples are displayed in Tables 7 and 8. The large samples do not contain the proxy voting variable, VB. Table 7 shows the large sample results for the MTB ratio and Table 8 contains the results for ROE. Firm performance is increasing in the banks' control rights from equity holdings, EB, when the MTB ratio is the performance measure. Nonbank blockholding also improves MTB and codetermination causes MTB to decline. The results using ROE as a performance measure are essentially noise.

Overall, we can summarize the results as follows. The first result is that banks affect firm performance beyond the effects they would have if they were nonbank

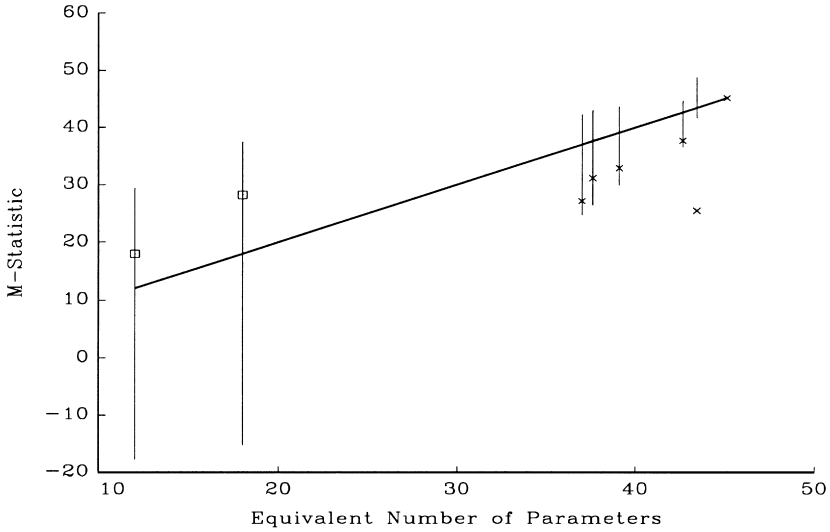

Fig. 5. M-plot for the small 1986 sample when firm performance is measured by the return on equity, ROE. The upward-sloping line is drawn under the assumption that the bias in the semiparametric estimation is negligible for the lowest value of the smoothing parameter we applied, $g = 0.75$. The $\times$-symbols represent alternative values for the smoothing parameter. The M-statistic and the equivalent number of parameters that comes with the lowest smoothing parameter is represented by the rightmost $\times$-symbol. The smoothing parameter increases in steps of 0.05 from right to left. The two box symbols represent parametric specifications; the right box stands for a quadratic least-squares specification (which includes squared and cross-terms of EB and H), while the left box is a linear least-squares specification (i.e., one without such terms). The vertical lines are 90% confidence intervals around the null hypothesis that the specification in question delivers unbiased estimates of the unknown functional form.

blockholders. An increase of the banks' control rights from equity ownership by one percentage point (i.e., 100 basis points) changes the market-to-book ratio of the firm by 0.23% in the small sample and by 0.41% in the large sample. The power of the banks cannot be due to the fact that they are blockholders because banks are included in the Herfindahl index of concentration of control rights, H. Thus, banks appear to be special in positively affecting firm performance.

Second, banks' proxy voting, VB, does not affect firm performance. In particular, there do not appear to be any conflicts of interest between banks' use of proxy voting and shareholders' interests. A possible reason for the statistical insignificance of VB can be that proxy voting is a mirror image of the firm's shareholder structure, which is sufficiently controlled for by EB and H.

Third, the concentration of control rights from equity ownership, H, is important in improving firm performance.

Finally, codetermination reduces firm performance. If β is the regression coefficient of a dummy variable in a semi-logarithmic regression equation, then

Table 5
Least-squares estimates of the influence of codetermination, Co, banks' equity control rights, EB, banks' proxy voting, VB, and concentration of equity control rights, H, on firm performance. Firm performance is measured by the (log of the) market-to-book value of equity, MTB. The dataset pools observations from the small 1975 and 1986 samples. Normalizing regressors include a dummy variable for voting restrictions, VR, a dummy variable for government-controlled firms, Go, (the log of) total assets as a measure for firm size, TA, a dummy variable for the observations from the 1986 sample, dummy variables for industry classification, and a constant term. Standard errors are corrected for heteroskedasticity following White (1980).

Independent variable	Coefficient	t-value
Co	-9.92×10^{-2}	−0.75
EB	2.30×10^{-1}	1.82*
VB	1.29×10^{-1}	0.61
H	5.28×10^{-1}	2.08**
VR	2.47×10^{-3}	0.02
Go	-3.88×10^{-1}	−1.49
TA	-1.20×10^{-2}	−0.28
Dummy 1986	2.90×10^{-2}	0.27
ISIC C	-6.66×10^{-1}	−2.74***
ISIC D	1.02×10^{-1}	0.63
ISIC E	-7.73×10^{-2}	−0.56
ISIC F	6.58×10^{-2}	0.57
ISIC G	-9.86×10^{-3}	−0.05
Constant	4.87×10^{-1}	0.54
R^2 adj.	0.06	
Wald-statistic	44.6***	
Number of observations	96	

Signi cant at 10% level (two-tailed t-tests).
**Significant at 5% level (two-tailed t-tests).
***Significant at 1% level (two-tailed t-tests).

$100(e^{\beta}-1)$ equals the percentage change of the dependent variable caused by a change of the dummy variable from zero to one (see Halvorsen and Palmquist, 1980). A change in the codetermination dummy variable from zero to one (i.e., a switch from no codetermination or one-third codetermination to equal representation) reduces the market-to-book ratio by 15.9% in the large sample; ROE is reduced by 3.25 basis points in the small sample. (The other cases have insignificant coefficients.)

5.3. Changes between 1975 and 1986

We now ask whether the effects of the firm's control rights structure on firm performance change significantly between 1975 and 1986. To examine this issue we test whether the coefficients on the control rights variables, EB, VB, and H, are significantly different between these two dates. Note that the large sample

Table 6
Least-squares estimates of the influence of codetermination, Co, banks' equity control rights, EB, banks' proxy voting, VB, and concentration of equity control rights, H, on firm performance. Firm performance is measured by the return on equity, ROE. The dataset pools observations from the small 1975 and 1986 samples. Normalizing regressors include a dummy variable for voting restrictions, VR, a dummy variable for government-controlled firms, Go, (the log of) total assets as a measure for firm size, TA, a dummy variable for the observations from the 1986 sample, dummy variables for industry classification, and a constant term. Standard errors are corrected for heteroskedasticity following White (1980).

Independent variable	Coefficient	t-value
Co	-3.25×10^{-2}	−3.04***
EB	2.24×10^{-3}	0.19
VB	5.58×10^{-3}	0.28
H	5.50×10^{-2}	2.96***
VR	1.95×10^{-2}	1.49
Go	-2.47×10^{-2}	−1.60
TA	1.38×10^{-2}	3.17***
Dummy 1986	-6.16×10^{-3}	−0.54
ISIC C	-3.35×10^{-2}	−2.58***
ISIC D	1.59×10^{-2}	1.29
ISIC E	1.01×10^{-2}	0.76
ISIC F	-1.06×10^{-2}	−1.03
ISIC G	2.05×10^{-3}	0.14
Constant	-2.57×10^{-1}	−2.82***
R^2 adj.	0.13	
Wald-statistic	36.1***	
Number of observations	138	

Signi cant at 1% level (two-tailed t-tests).

does not contain bank proxy voting, as measured by VB. We present results from Wald-tests that are based on a heteroskedasticity-consistent variance-covariance matrix as proposed by White (1980).

For the small sample, the results are as follows. When the performance measure is the MTB ratio, $\chi^2(3) = 5.120$ and $p = 0.163$, and when ROE is the performance measure, $\chi^2(3) = 0.201$ and $p = 0.977$. In the large sample, when the performance measure is the MTB ratio, $\chi^2(2) = 2.409$ and $p = 0.300$, and when ROE is the performance measure, $\chi^2(2) = 2.319$ and $p = 0.314$. Thus, there are no significant differences in the influence of the control rights structure between the years 1975 and 1986.

5.4. *Comparison of the results to Cable (1985)*

Cable (1985) is the only previous study of the effects of German bank relationships on German firms' performance. Cable uses a subset (48 AGs) of

Table 7
Least-squares estimates of the influence of codetermination, Co, banks' equity control rights, EB, and concentration of equity control rights, H, on firm performance. Firm performance is measured by the (log of the) market-to-book value of equity, MTB. The dataset pools observations from the large 1975 and 1986 samples. Normalizing regressors include a dummy variable for voting restrictions, VR, a dummy variable for government-controlled firms, Go, (the log of) total assets as a measure for firm size, TA, a dummy variable for the observations from the 1986 sample, dummy variables for industry classification, and a constant term. Standard errors are corrected for heteroskedasticity following White (1980).

Independent variable	Coefficient	t-value
Co	-1.74×10^{-1}	−2.19**
EB	4.09×10^{-1}	3.70***
H	3.30×10^{-1}	3.70***
VR	4.29×10^{-2}	0.35
Go	-2.72×10^{-1}	−2.12**
TA	-4.43×10^{-2}	−2.76***
Dummy 1986	2.29×10^{-1}	4.12***
ISIC A	1.10	3.24***
ISIC C	1.71×10^{-1}	0.60
ISIC D	2.99×10^{-1}	4.71***
ISIC E	1.66×10^{-1}	1.13
ISIC F	-7.97×10^{-2}	−0.80
ISIC G	4.31×10^{-1}	3.06***
ISIC H	-6.99×10^{-2}	−0.98
ISIC I	4.74×10^{-1}	1.84*
ISIC J	-1.97×10^{-1}	−1.75*
Constant	1.08	3.54***
R^2 adj.	0.12	
Wald-statistic	145***	
Number of observations	563	

*Significant at 10% level (two-tailed t-tests).
**Significant at 5% level (two-tailed t-tests).
***Significant at 1% level (two-tailed t-tests).

our sample for 1975. He averages other variables over the period 1968–1972. Cable's dependent variable, a performance measure, is the ratio of the aftertax income of equity to total assets of the firm. While Cable estimates many models, the most general includes (i) the square of each bank's voting fraction, (ii) a dummy variable for each of the three largest banks that equals one if the bank has supervisory board seats, (iii) the ratio of total bank borrowing to total debt, (iv) a Herfindahl index of the top 20 nonbank shareholders, and (v) normalization variables.

There are a number of important differences between Cable's approach and ours. First, calculation of Cable's performance measure is debatable because it

Table 8
Least-squares estimates of the influence of codetermination, Co, banks' equity control rights, EB, and concentration of equity control rights, H, on firm performance. Firm performance is measured by the return on equity, ROE. The dataset pools observations from the large 1975 and 1986 samples. Normalizing regressors include a dummy variable for voting restrictions, VR, a dummy variable for government-controlled firms, Go, (the log of) total assets as a measure for firm size, TA, a dummy variable for the observations from the 1986 sample, dummy variables for industry classification, and a constant term. Standard errors are corrected for heteroskedasticity following White (1980).

Independent variable	Coefficient	t-value
Co	1.92×10^{-3}	0.20
EB	3.91×10^{-3}	0.49
H	1.31×10^{-2}	0.83
VR	2.07×10^{-2}	1.84*
Go	2.81×10^{-3}	0.28
TA	7.82×10^{-4}	0.50
Dummy 1986	-1.84×10^{-2}	−2.45**
ISIC A	9.74×10^{-4}	0.05
ISIC C	2.81×10^{-2}	1.20
ISIC D	1.82×10^{-2}	3.14***
ISIC E	6.57×10^{-4}	0.06
ISIC F	3.19×10^{-4}	0.06
ISIC G	9.47×10^{-3}	1.57
ISIC H	3.50×10^{-6}	0.00
ISIC I	-9.93×10^{-3}	−1.49
ISIC J	2.25×10^{-2}	1.33
Constant	2.29×10^{-2}	0.77
R^2 adj.	0.002	
Wald-statistic	50.9***	
Number of observations	563	

*Significant at 10% level (two-tailed t-tests).
**Significant at 5% level (two-tailed t-tests).
***Significant at 1% level (two-tailed t-tests).

divides the income of the equity holders by total assets (i.e., the numerator of return on equity is divided by the denominator of the return on assets). Second, our view is that board membership and bank borrowing are endogenous. (Cable includes the ratio of total bank borrowing to total debt as an independent variable but it would seem to depend on the ownership variables, which he also includes.) Thirdly, Cable does not differentiate between the votes that banks cast in proxy and the votes that they hold as owners of firm equity (he includes the sum of the two).

Although it is hard to interpret Cable's results, his own conclusion is that there is a significant positive impact on firm performance from interaction with banks. Edwards and Fischer argue that "Cable's study provides considerably

more support for the view that what is distinctive about German AGs is their typically concentrated share ownership, which means that there are incentives for large shareholders to monitor management carefully, and so improve profitability" (p. 226). Our results are not in agreement with this interpretation. Instead, we support Cable's own conclusion because we showed that banks are special; they affect firm performance in a way that cannot be attributed simply to their role as blockholders.

6. Banks and the supervisory board

The ability to influence firm performance could be related to membership on the firm's supervisory board, the board that has important power in running the firm. In this section, we examine bank representation on the firms' supervisory boards.

Bank representation on supervisory boards has been almost as controversial as bank proxy-voting power. The Monopolkommission (1980) finds that commercial bank representatives accounted for 9.8% of all supervisory board members of the 100 largest AGs in 1978 and were represented on 61 of the top 100 boards. The largest three banks held 94 of the 145 bank representatives. In 1974, banks held seats on the supervisory boards of 59 out of the 74 officially quoted large companies (Studienkommission, 1979; Krümmel, 1980).

We did not use the supervisory board representation of banks as an explanatory variable in our regressions, because the power that comes from board representation is power that is "derived" from equity control rights as measured by EB, VB, and HH. However, we are interested in knowing whether equity control rights translate into supervisory board membership. It is important to stress that this is not necessary for firm performance to be affected by a bank relationship, though we are interested in whether it is a channel of influence.

For our analysis, the dependent variable is the number of seats held by banks divided by the number of seats allocated to shareholder representatives. (No honorary board members are taken into account.) Appendix A provides detail on the data sources. We use the same independent variables as before except that we do not include the industry dummies (because they are, as a group, not statistically significant). Also, for this analysis we use a Herfindahl index that *excludes* banks (HNB), with the fraction of equity owned by nonbanks (as a group) normalized to unity. Previously, we wanted to identify bank power as distinct from the power of nonbank blockholders, so we included banks in the Herfindahl index, H. For the analysis of board seats, we do not include banks in the index, because banks and nonbank blockholders can be in competition for seats. Also, we included slope dummies for the influence of (the log of) total assets, instead of relying on the intercept dummy to pick up changes in the price deflator. This allows us to interpret the intercept dummy in a meaningful way as

Table 9
Tobit estimation of the influence of codetermination (Co), banks' equity control rights (EB), and concentration of nonbank shareholders' control rights (HNB), on the fraction of (voting) supervisory board seats held by banks. The fraction of the supervisory board seats occupied by banks was measured relative to the number of supervisory board seats that are assigned to shareholder representatives (as opposed to those that are assigned to employee representatives). The dataset pools observations from the small 1975 and 1986 samples. Normalizing regressors include a dummy variable for voting restrictions (VR), a dummy variable for government-controlled firms (Go), (the log of) total assets as a measure for firm size (TA), a dummy variable for the observations from the 1986 sample, dummy variables for industry classification, and a constant term. The variance–covariance matrix was estimated following Eicker (1967) and White (1980).

Independent variable	Coefficient	t-value
Co	-1.12×10^{-2}	−0.18
EB 1975	6.10×10^{-1}	4.20***
EB 1986	1.78×10^{-1}	3.41***
VB 1975	1.66×10^{-1}	2.09**
VB 1986	1.96×10^{-1}	1.93*
HNB 1975	-1.02×10^{-1}	−1.28
HNB 1986	8.06×10^{-3}	0.14
VR	4.87×10^{-3}	0.14
Go	7.94×10^{-2}	0.52
TA 1975	4.96×10^{-3}	0.23
TA 1986	-3.57×10^{-2}	−1.85*
D 1986	8.77×10^{-1}	1.43
Constant	5.36×10^{-2}	0.12
χ^2 (structural break)	14.0***	
χ^2 (nonconstant regressors)	48.3***	
Number of positive observations	116	
Number of observations	138	

*Significant at 10% level (two-tailed t-tests).
**Significant at 5% level (two-tailed t-tests).
***Significant at 1% level (two-tailed t-tests).

a measure of change in the autonomous fraction of board seats occupied by banks.

The dependent variable is a fraction that is bounded at zero and has indivisibilities, which are particularly relevant for its numerator because the number of seats occupied by banks is an integer. Thus, the dependent variable is censored. We therefore estimate a Tobit model. A drawback here is that the size of the board varies among the sample firms and thus the indivisibilities might not have the same effect for all the firms.

The results for the pooled sample are shown in Table 9. In both 1975 and 1986, bank control rights from equity ownership are significant in determining the fraction of supervisory board seats that banks hold. A χ^2 test for the joint significance of the intercept dummy variable and the slope dummies for the EB,

VB, and HNB gives $\chi^2(4) = 13.99$ and $p = 0.007$, indicating that there is a statistically significant structural break between 1975 and 1986.

The regressions presented by Edwards and Fischer (1994, pp. 198–210) use the same underlying data set on supervisory board membership as we do and as Cable (1985) did for the 1975 sample. However, the dependent variable and the sample in our analysis will differ from Edwards and Fischer in ways that turn out to be important. First, Edwards and Fischer restrict their sample to those stock corporations (51 firms) for which banks cast more than 5% of the votes at the annual meetings of 1975 (votes from equity ownership plus proxy votes). (This is because that is the way the Monopolkommission provided this information.) However, the remaining firms have negligible values for EB and VB, mostly because these firms are closely held. For this reason we do not restrict ourselves to those 51 companies that Edwards and Fischer analyze. Another issue with the Edwards and Fischer results is that these authors use the absolute numbers of seats (held by banks) as the endogenous variable. However, the total number of seats on the supervisory board in their sample of 51 companies varies between three (for Triumph International AG) and 21 (for August Thyssen-Hütte AG, for example). (See Verlag Hoppenstedt, *Handbuch der deutschen Aktiengesellschaften*, 1974/75 and 1975/76 issues, Darmstadt.)

7. Discussion of the results

In a stock-market-based economy, corporate governance can occur via assembling blocks to take over or influence managers when this intervention is valuable. In a bank-based economy, there is no market for corporate control. Instead, banks are heavily involved in corporate governance. Dow and Gorton (1997) argue that bank-based economies can, in theory, be just as efficient as stock market economies. While our results are consistent with this general notion, there are many important missing details. Our results pose many questions for further research. In this section we briefly discuss some of these questions.

The two most important questions are interrelated. First, what is the source of bank power that makes it possible for banks to improve the value of firms? Second, what are the incentives that induce banks to use their power to improve firm performance, as opposed to extracting private benefits to the detriment of firm performance? Our results are consistent with the view that bank blockholders, having acquired a block of stock from a family or as a result of distress, have an incentive to monitor the firm if the stock market is illiquid. Basically, when the stock market is illiquid the bank blockholder can only sell at a large loss (Bhide, 1993). This creates an incentive to maintain a close relationship with the firm. In fact, the illiquidity commits the bank to monitor. This argument applies to all blockholders, while our results go further to distinguish banks

from other blockholders in their ability to affect performance; banks are more powerful than nonbank blockholders because they improve firm performance beyond what nonbank blockholders can achieve. For example, Bethel et al. (1998) find that in the U.S., "activist" blockholders (e.g., raiders) are more effective than institutional blockholders in causing value-increasing changes at firms. It is not simply a matter of counting up the number of votes held by a blockholder. Thus, the important question is: What is special about banks compared to nonbank blockholders? One possibility is that banks have more power than nonbank blockholders because banks have the credible threat of cutting off external finance. Just as banks cannot feasibly sell their blocks, without liquid capital markets, firms have no outside option for financing and must rely on their banks. The absence of a deep stock market forces banks and firms into a symbiotic relationship that can substitute for disciplining via takeovers. Another (nonmutually exclusive) possibility is that banks have better information, and possibly superior expertise, relative to other blockholders.

Why do banks improve firm performance? Why do they not act in their private interests? One answer concerns the possible positive correlation between bank control rights from equity ownership and bank ownership of cash-flow rights. To the extent that banks own cash-flow rights they have a financial incentive to improve the performance of firms and will use their power to this end (Jensen and Meckling, 1976; La Porta et al., 1999b). Bank ownership of control rights and cash-flow rights could be positively correlated despite the institutional features, such as codetermination, voting restrictions, pyramiding, cross-shareholdings and stocks with multiple votes, that act to uncouple them. The fact that banks have cash-flow rights in the form of loans, as well as equity claims, might be important in this regard.

Another (nonmutually exclusive) explanation for the behavior of banks concerns the issue of who monitors the banks. In a purely formal sense, Diamond's argument about "monitoring the monitor" might apply in Germany, but certainly the depositors of a bank would not mind if the bank extracted private benefits from client firms if they could benefit from this. However, in Germany, banks may be treated as quasi-public institutions, a view that is perhaps consistent with the degree of public scrutiny they receive. It is also consistent with the view of Allen and Gale (1997), who present a model of (German) banking that relies on a sort of social compact to set up and maintain the banking system with a fixed rate of interest on deposits (i.e., it does not vary across the business cycle). In their overlapping generations framework, some generations have an incentive to renege on this compact but, for unexplained reasons, do not. Clearly, these issues remain unresolved.

Another question for further research concerns proxy voting. If banks improve performance with respect to their own holdings, why do they not use their proxy power to further improve firm performance? There are several possible explanations for this result. First, banks simply may not need this additional

power. Second, were banks to use their power overtly (even if for the good) they might face social sanctions. Finally, bank power is limited by the ability of individuals to tell banks how to vote. If individuals felt this were necessary to do, they might prefer to deposit their stock with another bank. Competitive pressure thus may limit bank power.

8. Conclusion

Little is known about corporate governance in economies in which the stock market is not a central institution. In economies with stock markets, the link between control rights and cash-flow rights is more direct and, consequently, can be the basis for takeovers as the ultimate form of governance. Poorly run firms can be taken over by a raider who buys shares in the stock market. Because a share purchase is the purchase of a bundle of cash-flow rights and control rights, the raider will have an incentive and the power to improve the value of the firm. In economies with small or nonexistent stock markets, banks appear to be very important. The concentration of effective, if not formal, power in banks is in contrast to the workings of stock market economies. Our investigation focuses on the extent to which a bank relationship in Germany affects firm performance when the mechanism of takeovers is absent and banks appear powerful.

What happens in economies in which the stock market is not so liquid and listings are few? In Germany, several institutional features, aside from the small stock market, suggest that the link between cash-flow rights and control rights is somewhat uncoupled. In particular, with respect to corporate governance, Germany has the following notable features: (i) bank equity ownership, (ii) proxy voting by banks, (iii) high concentration of equity ownership, and (iv) codetermination. We empirically investigate whether these features interact in ways that provide a role for banks to positively affect the performance of firms. When doing that we take into account (i) voting restrictions, (ii) pyramiding, (iii) cross-shareholdings, and (iv) stocks with multiple votes.

We find evidence supporting the notion that banks are an important part of the corporate governance mechanism in Germany. Firm performance, measured by the market-to-book value of equity, improves to the extent that banks have control rights from equity ownership. During the periods we investigate, banks do not extract private value to the detriment of firm performance. We find no evidence of conflicts of interest between banks and other shareholders. In particular, we find no evidence that banks use proxy voting to further their own private interests or, indeed, that proxy voting is used at all. It appears, then, that corporate governance mechanisms that are different from those that operate in stock-market-based economies can be effective. Clearly, however, many questions remain to be studied.

Appendix A. Data sources

A.1. The 1975 samples

The small 1975 sample is constructed from the list of the top 100 stock corporations (*Aktiengesellschaften*) of the year 1974, published in Monopolkommission (1978). The criteria for choosing the firms are described in Monopolkommission (1977).

Of these 100 companies, we drop 18 companies: three firms were joint ventures of nonprofit cooperatives; two firms published their unconsolidated reports according to the accounting rules of banks; two firms were Kommanditgesellschaften auf Aktien, a hybrid ownership form between a stock corporation and a partnership; two firms published only consolidated financial statements; two firms were in the process of restructuring (one of them after a change in ownership); one firm did not publish an annual report; five firms were in financial distress; and, finally, for one firm we could not determine the ownership structure.

The accounting data on each firm and information on voting restrictions are from *Handbuch der deutschen Aktiengesellschaften* and from *Saling Aktienführer*, Verlag Hoppenstedt, Darmstadt, various issues. Information on bank proxy voting (for the small sample) comes from reports on annual shareholder meetings that took place in 1975, published in Monopolkommission (1978). Information on equity ownership structure was collected for the year 1975; it is from Monopolkommission (1977), from *Handbuch der deutschen Aktiengesellschaften*, various issues, and from *Saling Aktienführer 1976*.

The large 1975 sample consists of all nonfinancial firms listed in *Saling Aktienführer 1976*. This volume covers all stock corporations traded in the first market segment (amtlicher Handel) or the second market segment (geregelter Freiverkehr) at any German stock exchange at the end of September 1975. Of 425 firms, we drop 142: seven were Kommanditgesellschaften auf Aktien; two firms published their unconsolidated reports according to bank guidelines; seven were nonprofit companies (six public transportation firms and one real estate firm); five were firms in the process of liquidation; one firm did not publish unconsolidated financial statements; 37 were real estate firms (most of which are "zombies", i.e., they have liquidated their production facilities); five were financial holding shells (firms whose main business is to hold equity stakes in other firms without serving as concern headquarters); 31 were firms in financial distress; 23 were delisted from the exchange within the next two years (i.e., within the period of time we measure firm performance); and 24 firms were missing information on ownership structure. We classify a firm as financially distressed if its equity's book value falls short of 110% of its equity's face value, i.e., the book value was lower than the face value plus the mandatory reserves, and the company is not a startup firm.

A.2. The 1986 samples

The small 1986 sample is drawn from the list of the 100 largest (by sales, based on consolidated figures) German manufacturing firms (of all legal forms) published on October 3, 1986 by the *Frankfurter Allgemeine Zeitung*. Thus, unlike the 1975 sample, the 1986 sample contains no retailers, transport, or media companies. We follow Böhm (1992) in using this list because he is our main source for the bank proxy voting data. The list contains 65 stock companies. Of these we drop nine companies: one firm was in the process of restructuring (after a change in ownership); three firms were Kommanditgesellschaften auf Aktien; and five firms were in financial distress.

Company data, including equity ownership, are again from *Handbuch der deutschen Aktiengesellschaften* and from *Saling Aktienführer*, various issues. Information on the equity ownership structure dates from 1986. Information on bank proxy voting comes from three sources: Gottschalk (1988), Böhm (1992), and our own survey of annual shareholder-meeting reports (procured from commercial registers in the province where the company is chartered), which corrected and supplemented the other sources. Proxy voting data are based on the attendance lists of annual meetings that took place in calendar year 1986. (The 1986 report of the annual meeting of Siemens AG was not available at the commercial register in Munich; we thus used the 1985 report.)

The large 1986 sample consists of all nonfinancial firms listed in *Saling Aktienführer 1987* (published in 1986). Again, this volume covers all stock corporations traded in the first (amtlicher Handel) and second market segment (geregelter Markt) at any German stock exchange at the end of September 1986. Of 432 firms, we dropped 152: four were Kommanditgesellschaften auf Aktien; seven were nonprofit companies; two firms were in the process of liquidation; one firm was in the process of restructuring; one firm was a target of a battle over a minority shareholder position (which heavily affected its stock value); eight firms filed for bankruptcy within the next two years (the period of time we measure firm performance); 52 were real estate firms (again, most of which are "zombies"); seven were financial holding shells; 54 were firms in financial distress; and 16 firms were delisted from the exchange within the next two years (i.e., within the period of time we measure firm performance).

Table 10 describes the industry classification of the firms included in the small samples. Table 11 describes the industry classification of the firms included in the large samples.

A.3. Supervisory board membership data

For the 1975 sample, data on board representation are taken (as in Edwards and Fischer, 1994, pp. 198–210) from Monopolkommission (1978). The 1986

Table 10
Distribution of firms in the small 1975 and 1986 samples by International Standard Industrial Classification (ISIC) as published by United Nations (1990). The classification was undertaken by the authors because there is no publicly available official industry classification of the corporations in our sample.

Number of firms 1975/1986	ISIC category	Industrial classification
5/1	C	Mining and Quarrying
54/38	D	Manufacturing
9/10	E	Electricity, Gas and Water Supply
6/5	F	Construction
6/2	G	Wholesale and Retail Trade; Repair of Motor Vehicles, Motorcycles and Personal and Household Goods
2/0	—	Not Classified (Highly Diversified)
Total: 82/56		

data on board representation are taken from Böhm (1992, pp. 257–262) and from *Handbuch der deutschen Aktiengesellschaften*, various issues.

A.4. Additional notes

(1) Both small samples are drawn based on size measures from consolidated reports. We have no control over this because we want to use the available proxy voting data that had already been collected based on these samples. However, we use unconsolidated financial statements. Since German firms can choose among several consolidation methods, their consolidated financial statements are poorly comparable over time and in cross-section. Also, since consolidation includes companies that are only partially owned by the firm in question, the analysis of unconsolidated reports has the advantage of providing a close link between equity ownership and firm performance.

(2) In both samples, and for the analysis of supervisory boards, Kreditanstalt für Wiederaufbau and Bayerische Landesanstalt für Aufbaufinanzierung are not treated as banks because they are government-controlled special purpose banks (for reconstruction and development). The first one is a federal institution and the latter one is a Bavarian bank. In our sample they are treated as government institutions.

Appendix B. Equity control rights and equity ownership structure

This appendix explains some of the assumptions and methods of calculation concerning the ownership structure of firms' control rights and also the

Table 11
Distribution of firms in the large 1975 and 1986 samples by International Standard Industrial Classification (ISIC) as published by United Nations (1990). The classification was undertaken by the authors because there is no publicly available official industry classification of the corporations in our sample.

Number of firms 1975/1986	ISIC category	Industrial classification
2/2	A	Agriculture, Hunting and Forestry
3/2	C	Mining and Quarrying
217/218	D	Manufacturing
26/23	E	Electricity, Gas and Water Supply
8/7	F	Construction
9/16	G	Wholesale and Retail Trade; Repair of Motor Vehicles, Motorcycles and Personal and Household Goods
1/1	H	Hotels and Restaurants
11/9	I	Transport, Storage and Communications
2/0	K	Real Estate, Renting and Business Activities
4/2	—	Not Classified (Highly Diversified)
Total 283/280		

calculation of the Herfindahl indices. The equity ownership data are not always detailed enough to obtain a complete picture of the equity control rights ownership structure. To calculate the Herfindahl index, we need to know, in addition to the details of bank equity holdings, the distribution of shares across nonbank blockholders and the percentage of shares that are dispersed. Tables 1 and 2 show some of the details of bank and nonbank ownership of voting rights, but to calculate the index we use data that are further disaggregated. In some cases, however, it is necessary to make some assumptions to complete the picture of equity ownership in order to calculate the index. We first explain these assumptions here. We then provide more information concerning how control rights from equity ownership are calculated, by providing some examples of the more complicated ownership structures.

B.1. Assumptions concerning equity ownership

In some cases, vote holdings are reported as greater than 25%, greater than 50%, greater than 75%, less than 25%, etc. In these cases, we adopt the following conventions (unless other information can make determination of the holdings more precise): we set "greater than 25%" equal to 26%; we set "greater than 50%" equal to 51%; etc. The reported inequalities refer to cutoff points

that are relevant for control purposes as discussed in Section 2. In other words, if x is the fraction of shares held by the particular blockholder, "greater than 25%" means $0.5 > x \geqslant 0.25$.

We assume that the banks vote all dispersed holdings if no other information can make this more precise. The bank proxy voting is originally reported as a percentage of votes in attendance at the annual shareholder meeting. Bank proxy voting at the annual meeting is taken to be dispersed shareholders' votes (though on rare occasions this is not true). We assume that shareholders that do not show up at the annual meeting are dispersed. (Note that this assumption applies only to calculation of the Herfindahl index and not to the fraction of bank proxy votes.)

An example will show how the aforementioned assumptions are used. For simplicity, we assume that for all blockholders in this example, the fraction of control rights equals the fraction of voting stock owned (i.e., there are no pyramids, cross-shareholdings or stocks with multiple votes). Let B_1 be the fraction of shares voted by blockholder 1 and B_2 the fraction voted by blockholder 2, etc. Suppose the data are that $EB = 0$, $B_1 > 0.25$, and $B_2 = 0.1$, and the rest are dispersed. The problem is that we do not know the exact size of B_1's holdings. If we have no other information, we assume $B_1 = 0.26$. However, from the proxy-voting fraction that banks vote at the annual meeting we can calculate VB under the assumption that the banks vote all dispersed shares. Then we obtain $B_1 = 1 - a \times VB - 0.1$, with a being the fraction of votes present at the annual meeting.

B.2. Control rights when equity ownership is complex

We give two examples of complex equity ownership structures, and how we calculated control rights in these cases. The first example is a case of a pyramid with direct and indirect holdings, shown in Fig. 6. Following our principle of defining control rights based on votes, the graph displays ownership as fractions of votes, which is not necessarily identical to the fractions of equity from which these votes are derived. On September 30, 1986, Energieversorgung Ostbayern AG was owned by Bayernwerk AG (a nonfinancial firm) with more than 50% of the shares, Energiebeteiligungs-Gesellschaft mbH (a financial holding shell) with more than 25% of the shares, and the State of Bavaria with 1.7%. As shown in the figure, the complications are first that 75% of Energiebeteiligungs-Gesellschaft mbH is owned by CONTIGAS Deutsche Energie-AG, a publicly traded utility, and 25% by Bayernwerk AG, which is also a utility but is not publicly traded. In addition, Bayernwerk owns 54% of CONTIGAS and 35% of Energiebeteiligungs-Gesellschaft. The ultimate owners are Bayernwerk AG, CONTIGAS and the State of Bavaria. Following the weakest link principle, control rights are allocated as follows: Bayernwerk AG 76% (51% plus 25%), CONTIGAS 26%, and State of Bavaria 1.7%.

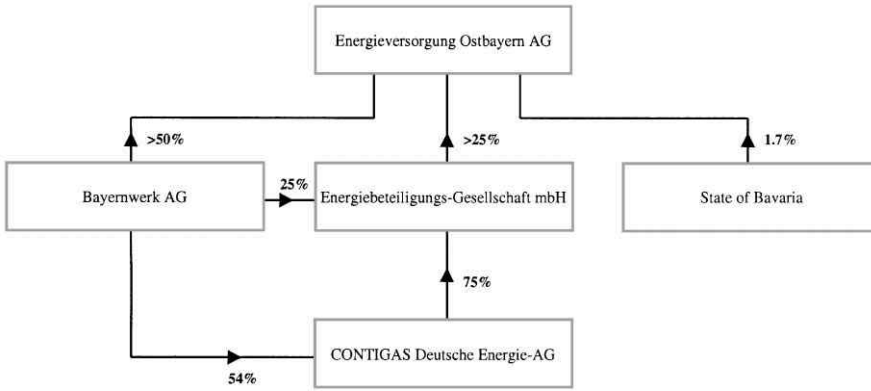

Fig. 6. Energieversorgung Ostbayern AG as an example of a complex pyramid with direct and indirect ownership, September 1986. Following our principle of defining control rights based on votes, the graph displays ownership as fractions of votes (which is not necessarily identical to the fractions of equity from which these votes emanate). Energieversorgung Ostbayern AG is owned by Bayernwerk AG (a nonfinancial firm) with more than 50% of the shares, Energiebeteiligungs-Gesellschaft mbH (a financial holding shell) with more than 25% of the shares, and the State of Bavaria with 1.7%. In addition, Bayernwerk owns 54% of CONTIGAS Deutsche Energie-AG, while CONTIGAS, in turn, owns 75% of Energiebeteiligungs-Gesellschaft. Bayernwerk also owns 35% of Energiebeteiligungs-Gesellschaft. Following the weakest link principle (La Porta et al., 1999a), control rights are allocated to the ultimate owners as follows: Bayernwerk AG 76% (51% plus 25%), CONTIGAS 26%, and State of Bavaria 1.7%. Data source: *Saling Aktienführer 1987*, Verlag Hoppenstedt, Darmstadt, 1986.

The second example, shown in Fig. 7, shows a pyramid with indirect ownership, direct ownership and circular ownership. (Again, the graph displays ownership as fractions of votes, which is not necessarily identical to ownership of equity.) In September 1975, Flachglas AG DELOG-DETAG is owned by Dahlbusch Verwaltungs-AG, a domestic financial holding shell, with 60.38%, by Glaverbel-Mécaniver S.A., a Belgian nonfinancial firm, with 12.47%, and by various families with unknown percentages. Flachglas AG itself owns 25% of Dahlbusch (circularity). About another 57% of Dahlbusch Verwaltungs-AG is owned by Glaverbel-Mécaniver S.A. (i.e., Glaverbel-Mécaniver owns stakes in Flachglas directly and indirectly). (We do not know the percentages of the families simply because they are not reported by Hoppenstedt. We use the term "about 57%" because Hoppenstedt uses it.) Allocation of control rights according to the weakest link principle is as follows: Glaverbel-Mécaniver S.A. is allocated 69.47% (57% plus 12.47%) and the firm itself (i.e., Flachglas AG) is allocated 25%.

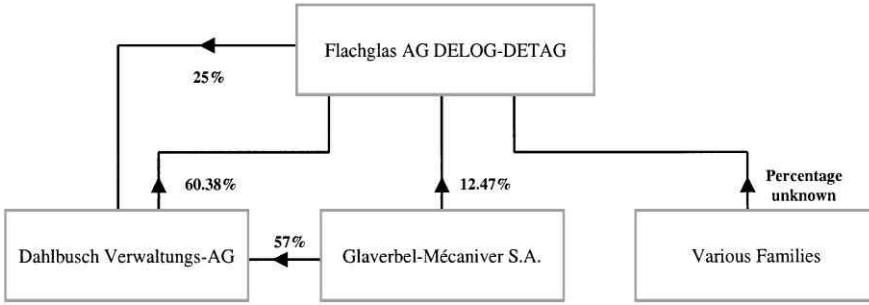

Fig. 7. Flachglas AG DELOG-DETAG as an example of a complex pyramid with direct and indirect ownership and cross-shareholding, September 1975. Following our principle of defining control rights based on votes, the graph displays ownership as fractions of votes (which is not necessarily identical to the fractions of equity from which these votes emanate). Flachglas AG DELOG-DETAG is owned by Dahlbusch Verwaltungs-AG, a domestic financial holding shell, with 60.38%, by Glaverbel-Mécaniver S.A., a Belgian nonfinancial firm, with 12.47%, and by various families with unknown percentages. Flachglas AG itself owns 25% of Dahlbusch (circularity). Another 57% of Dahlbusch Verwaltungs-AG is owned by Glaverbel-Mécaniver S.A. (i.e., Glaverbel-Mécaniver owns stakes in Flachglas directly and indirectly). Allocation of control rights according to the weakest link principle is as follows: Glaverbel-Mécaniver S.A. is allocated 69.47% (57% plus 12.47%) and the firm itself (i.e., Flachglas AG) is allocated 25%. Data source: *Saling Aktienführer 1976*, Verlag Hoppenstedt, Darmstadt, 1975.

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