Class Struggle Inside the Firm: A Study of German Codetermination

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Gary Gorton
The Wharton School
University of Pennsylvania
Philadelphia, PA 19104,
and NBER

Frank Schmid
Federal Reserve Bank of St. Louis
St. Louis, MO 63102

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Abstract

Under the German corporate governance system of "codetermination," employees are legally allocated some control rights over corporate assets, in the form of board seats. We empirically investigate the implications of equal board representation compared with one-third employee representation and find a 26% stock market discount on firms with equal representation. Employees redistribute the firm's surplus towards themselves but may also prefer a different objective function for the firm, maximizing employee utility rather than shareholder value. We investigate the shareholder response to codetermination via higher leverage that commits more cash to leave the firm. We also examine the relationship between codetermination and the performance sensitivity of compensation for board members.

"The campaigns for … codetermination on boards of directors appear to be attempts to control the wealth of stockholders' specialized assets … a wealth confiscation scheme" Alchian (1984, p. 46).

"Laws on Codetermination, combined with a tradition of patriarchal concern, have made European CEOs deeply committed to their employees, treating them more like partners in a long-term enterprise than anonymous factors of production" Henzler (1992, p. 60).

I.   Introduction

Corporate governance structures vary in significant ways around the world, raising important questions of economic welfare. One way governance varies is with respect to the role of employees. In many countries employees have an important role in running the firm (see, e.g., Hansmann, 1990, and Rippey, 1988). In Germany, in particular, the employees of some firms (depending on size) are allocated some control rights by law (in the form of board seats), although in general, they have no cash flow rights (in the usual sense of residual financial claims).[1] The general idea is for the suppliers of capital and the suppliers of labor to "cooperatively" run the firm. More specifically, to protect employees' interests, employees are legally "entrenched," that is, made immune from the wishes of shareholders and management, to some extent. If contracts are incomplete, allocating some control rights to employees may be optimal as employees may only then be willing to develop firm-specific human capital.[2] Also, employees in a codetermined system may monitor managers who would otherwise not necessarily act in the interests of outside shareholders. Overall, the German codetermination system provides an alternative model of corporate governance to the Anglo-American shareholder system. In this paper, we empirically study codetermination in Germany.

Under the German system of codetermination firms may be required by law to appoint employees to the supervisory board of the firm. Codetermination laws apply to all German private corporations (GmbHs) with more than 500 employees, and to all stock corporations (AGs). Depending on the size of the firm, employees may constitute either one half or one third of the firm's supervisory board. These two codetermination regimes are called parity-codetermination and non-parity codetermination. The board system in Germany is two-tiered: there is the supervisory board and the management board. The management board runs the day-to-day operations; its chairman (or "speaker") is the firm's CEO. The supervisory board oversees the management board, appoints its members, sets their salaries, and approves major decisions. It is the management board that determines the strategic direction of the firm. Consequently, while these firms are generally unionized, codetermination is different than

unionization because employees (and not just those in unions) can potentially influence the firm's choice of activities and the division of profit.

Corporate control rights in the form of votes are valuable.[3] But, it is not clear that board seats are valuable. In general, studies have found that board composition, usually the distinction between outside and inside directors, is not related to corporate performance (see Hermalin and Weisbach, forthcoming, for a survey of the literature), and boards in the U.S. are widely held to be ineffective (see, e.g., Morck, Shleifer, and Vishny (1989)). However, as Hermalin and Weisbach stress, the independence of outside directors is unobservable, and the choice of directors is, in any case, endogenous, so the empirical results to date are far from definitive. Codetermination offers a setting where the issue of the value of board seats can be reexplored. Codetermination is exogenously imposed by law (though firm organizational form is endogenous) and employees may well have different preferences than shareholders. However, codetermination affects the composition of the membership of the supervisory board and, under a two tier board system, the supervisory board relies on the management board for information. Thus, seats on the supervisory board may not be valuable.[4]

Codetermination also raises the welfare question of whether control rights (i.e., board seats) should be allocated exclusively to a firm's shareholders. In other words, who should control the firm? Questions of the identity of legitimate firm "stakeholders" are controversial and for the same reason codetermination has been controversial since its inception; literally thousands of papers have been written on the subject.[5] Jensen and Meckling (1979) point out that codetermination is a binding constraint: Shareholders could have adopted such a system voluntarily, but they did not. They suggest that it must, therefore, be inefficient. Freeman and Lazear (1995) and Levine and Tyson (1990) argue the opposite viewpoint, that codetermination could be socially efficient, but not in the shareholders' private interests. It may be that the firm's total revenues would increase with codetermination, but the owners' share would shrink (Freeman and Lazear, 1995; also see Dow, 1993). Alternatively, it may be that while privately beneficial for each firm individually, there is a coordination failure because no one firm wants to risk being the first to adopt codetermination (see Levine and Tyson, 1990). Therefore, it is argued, the government must introduce codetermination by law, much as firm owners would not have adopted the National Labor Relations Act in the United States voluntarily.

The allocation of control rights to corporate assets may have important implications for economic efficiency. In Germany, only public limited companies can raise equity, but owners of smaller and medium-sized companies regard the public limited organizational form as

unattractive, partly due to codetermination (see Bank of England (1984)). Also, employees may want to use the firm as an intertemporal insurance vehicle, resisting restructuring, lay-offs, and wage reductions, protecting themselves against (business cycle) shocks to the firm, as predicted by the theoretical models of Chang (1992) and Miyazaki (1984).[6] There is some indirect evidence for this. The wage structure in Germany is remarkably stable (see Prasad (2000)) and displays relatively little dispersion, compared to other developed economies (see Nickell and Bell (1996)). In fact, in a similar vein, firms with strong labor unions in the U.S. tend to be less responsive to labor market conditions; for example, see Freeman and Medoff (1984, 1981). The idea that employees' resistance to restructuring inhibits shareholder's flexibility in responding to changing market conditions is related to the literature on "Eurosclerosis," the idea that labor markets in European economies cannot respond to large shocks because of governmental and institutional restrictions.

We empirically investigate the following broad questions. First, does equal representation on the supervisory board, as compared to one-third representation, affect firm performance? It may be that there are no effects of codetermination, either because employees simply do not have enough power via their board seats to affect the firm, or because shareholders have responded to codetermination with effective countermeasures.[7] Second, we investigate whether shareholders take countermeasures to try to mitigate the effects of employees' decisions. One countermeasure concerns capital structure. Shareholders (at the firm's annual meeting) may increase firm leverage to commit more of the firm's cash flows to external creditors. As discussed below, this has been a response of shareholders to unionization in the United States and the United Kingdom. Another countermeasure concerns the performance sensitivity of compensation issues for board members. In addition to altering the capital structure and the equity ownership structure of the firm in response to codetermination, shareholders can (at the firm's annual meeting) also set the incentive system, that is, they can alter the compensation arrangements to try to affect the firm's decision-making. So, we investigate the sensitivity of the compensation of board members to codetermination.

The paper proceeds as follows. Section II is a brief literature survey. Section III provides some background on the German codetermination system and German corporate finance. Section IV introduces the data and discusses German ownership. Section V reports on the empirical results with regard to effects of equal representation on measures of firm performance. Section VI analyzes the capital structure response of shareholders to

codetermination. Section VII examines whether codetermination affects board compensation. Finally, Section VIII concludes.

II.   The Literature on Codetermination and Related Issues of Worker Control

The literature on German codetermination is massive, but there is relatively little quantitative work.[8] As FitzRoy and Kraft (1993) put it: "…there have been few attempts to quantify economic effects, and they all suffer from inadequate data and methodology" (p. 366). Kraft (1989) surveys some of this literature. In this section we briefly provide an overview of the literature on codetermination and some related issues.

Svejnar (1982b) analyzes relative wages at the industry level, in the coal and steel industries, using annual data over the period 1946-1972. (The coal and steel industries are covered by special codetermination laws; see Appendix A.) He finds that the introduction of codetermination (in these industries) in 1951 was accompanied by a wage increase in steel, but not in coal mining. Also, see Svejnar (1981, 1982a). Benelli, Loderer, and Lys (1987) use accounting data to compare leverage, profitability, dividend payout, capital intensity, and total workers' pay, before and after passage of the 1976 Codetermination Act, for matched pairs of firms. They also present "event" studies based on passage of the 1976 Act. The sample size is 64. They find few effects of codetermination. Their main finding is that stock return variances decline following passage of codetermination laws, "[these] results [are] consistent with the implication that codetermination leads to less risky investments" (p. 563). Gurdon and Rai (1990) find a higher rate of return on assets after 1976, but their sample is 28, compared with a control group of eight firms. FitzRoy and Kraft (1993) study 68 companies in two years: 1975, the year before the 1976 Codetermination Act was passed, and 1983. They estimate translog value-added equations and find that codetermination reduced productivity by 19.7%.[9] They also find that return on equity declines. Cable and FitzRoy (1980) estimate a Cobb-Douglas production function using data on 42 firms. They include as an input a measure of "participation" of workers in firm decision-making based on a questionnaire and find that "participation" increases productivity. In summary, previous studies use small samples and obtain mixed results.

Almost all of these studies examine firms before and after 1976 or before and after 1951 (the years when major codetermination legislation was passed, as described below) to identify the effects of codetermination. This requires data from periods when data is quite costly to collect, which explains why sample sizes are so small. The paucity of data is a serious problem and motivates the approach in this paper, discussed below. The stock market has played a much

smaller role in the savings-investment process in Germany than in the United States and the United Kingdom. This is probably the main explanation for the dearth of empirical work on the codetermination system. Without a stock market that requires disclosure and generates price data, it is more difficult to obtain data, limiting the analysis somewhat.

Rather than study the behavior of firms before and after the passage of a codetermination law, we study a panel of firms and rely on cross-section variation in the fraction of votes held by employee representatives on the supervisory board to identify the effects of codetermination. We focus on the 1990s and, consequently, have a much larger sample. In addition, by the 1990s firms have adjusted to the presence of codetermination. Nevertheless, studying a panel also has issues. Large firms tend to have many employees, and consequently are subject to parity codetermination. Conversely, firms with non-parity codetermination tend to be smaller. This may confound the effects of codetermination with the effects of size. In what follows, we econometrically address these issues.

The general question of how employee control or influence over the disposition of corporate assets affects firm behavior and value has been addressed in the literature on labor unions. Labor unions are an instance where workers are not allocated control rights, but may have more bargaining power than nonunion workers. Ruback and Zimmerman (1984), using event study methodology, find that announcements of unanticipated collective bargaining agreements reduce equity value. Salinger (1984) studies monopolized industries and finds that unions capture most monopoly rents. Abowd (1989) finds that union members' wealth and shareholders' wealth move in opposite directions when there is an unexpected change in bargained labor costs. Also, see Freeman and Medoff (1984), Clark (1984), Bronars and Deere (1990, 1991), and Voos and Mishel (1986), among others. In general, the conclusion is that unionization is associated with lower firm profitability. (See Hirsch, 1991, for a brief survey.) But, while unions are successful in redistributing firm surplus towards workers, there is little evidence that they have altered firms' real operating decisions, that is, the firm's objective function.

Stockholders or capitalists respond to unions and the threat of unionization by committing to pay cash out of the firm via leverage. Bronars and Deere (1991) "find strong evidence of a positive relationship between unionization and debt-equity ratios using a set of large, publicly-traded firms" (p. 232). This empirical result is confirmed by Garvey and Gaston (1996) and is consistent with bargaining models in which financing with senior debt commits the firms to a tougher bargaining stance with respect to negotiated wages (see Perotti and Spier

(1993). We examine this issue as well. The German firms that we study are unionized, but, as explained below, codetermination includes a broader range of employees than simply unionized workers. Since codetermination may result in more power over decision-making in the firm than unions have, it is less clear that leverage will be used in the same way.[10]

III.   The German Codetermination System and Corporate Governance

In this section we provide some background on the legal forms of ownership in Germany, the codetermination laws, and the German system of corporate governance. We also examine the identities of supervisory board members.

A. Legal Forms of Corporate Ownership and Codetermination

Aside from sole proprietorships, German firms can be organized into limited liability companies (Kapitalgesellschaften, i.e., corporations) and partnerships (Personengesellschaften). The most common forms of limited liability companies are Aktiengesellschaften (AGs) and Gesellschaften mit beschränkter Haftung (GmbHs). AGs, literally "stock companies," are the equivalent of publicly held companies in the United States or public limited companies in the United Kingdom. GmbHs, literally "corporations with limited liability," are similar to stock corporations except that there is no traded stock and disclosure rules are less strict. Partnerships are organized either as an Offene Handelsgesellschaft (OHG), a general partnership, or a Kommanditgesellschaft (KG), a limited partnership.

Codetermination laws apply to GmbHs with more than 500 employees and to stock corporations (AGs). If there are costs to the owners due to employees legally being allocated control rights via board membership, then owners may choose to forego these organizational forms. Broadly, there appears to be evidence that German owners do indeed choose ownership structures that avoid codetermination (though there are many other factors involved, as well). Edwards and Fischer (1994) point out that: "It appears that legal forms of enterprise with owners who are not protected by limited liability are much more important in the German than in the UK economy" (p. 83). Partnerships and sole proprietorships are much more important in Germany than in the United States or the United Kingdom.

AGs and big GmbHs are governed by a two-tier board system: the supervisory board (Aufsichtsrat) and the management board (Vorstand). (All stock corporations must have a supervisory board, but GmbHs are not required to have one as long as they do not have more than 500 employees, i.e., as long as they are not required to have employee representatives on the

supervisory board.) The management board runs the company and reports to the supervisory board. The main function of the supervisory board is to control and monitor management and, in this capacity, the supervisory board has the right to appoint and dismiss members of the management board, fix their salaries, and (depending on the corporation's articles of association) approve major decisions of the management board. In particular, corporate restructuring, changes to the lines of business and other strategic realignments need the supervisory board's approval.[11]

There are three different forms of codetermination in Germany. These are detailed in Appendix A. First, under 1951 legislation, equal representation between employees and shareholders is required in the coal and steel industry (*Montan* codetermination). Second, under the Codetermination Act of 1976, if the corporation has more than 2,000 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, which is a body of workers that participate in firm decision-making below the supervisory board level. The remainder of the employee representatives consists of external trade union representatives. Even though half the seats go to workers, representation is not quite equal since the chair, appointed by the shareholders, has an extra vote. Also, at least one employee representative must be elected from the *leitende Angestellte* (senior executives or senior managers). Third, under the Works Constitution Act of 1952, one-third employee representation is required of companies with 500 to 2,000 employees.[12]

The importance of codetermination as a feature of the German economy is shown in Table 1, which displays the fraction of employees by codetermination type in the public sector and in the private sector and for the whole economy. Employees fall into the category of so-called dual codetermination if their employers have both works councils (codetermination on the shop-floor level) and equal representation on the supervisory board. Equal representation on the supervisory board may be *Montan* codetermination or parity codetermination according to the 1976 Codetermination Act. Single codetermination refers to the situation in which employers have works councils, but are not subject to equal representation on the supervisory board. Companies without equal representation on the supervisory board may be subject to 1/3 codetermination according to the 1976 Codetermination Act or have no labor representation on the supervisory board. Employees are assigned to a regime of no codetermination if their employers have neither works councils nor equal representation on the supervisory board. The public sector generally has representation on the shop-floor level, but supervisory boards do not

exist. Media companies and many nonprofit organizations are exempt from codetermination due to the constitutional freedoms of expression and faith.

In our analysis, we concentrate on the most common forms of codetermination: equal representation (parity codetermination other than *Montan* codetermination) and non-parity codetermination (where one third of the supervisory board members are employee representatives). We measure the impact of equal representation by comparing firms with equal representation to those with one-third representation. The extra influence of equal representation has been confirmed repeatedly in field studies (Niedenhoff, 1993; Gerum, Steinmann and Fees, 1988). Also, we analyze the impact of codetermination for stock corporations (AGs). Figures published in the financial statements of GmbHs tend to be highly aggregated, making a meaningful empirical study impossible.

B. The Ownership Structure of German Firms, Banks, and Monitoring

In addition to codetermination, there are other features of the German governance system that differ from the Anglo-American system and which play roles in our analysis. These features are of independent interest. One such important feature is the widespread presence of block shareholders. In stock market-based economies, outside block shareholders are often viewed as monitors of firms' managers (see, e.g., Shleifer and Vishny, 1986; Kahn and Winton, 1998; and Maug, 1998). But, the empirical evidence for this in the United States is mixed, e.g., Demsetz and Lehn (1985), Mikkelson and Ruback (1985), and Holderness and Sheehan (1988). In Germany, block share holding is much more pervasive compared to the stock market-based economies of the United States or the United Kingdom. The samples in Gorton and Schmid (2000) display the importance of block holders: 65 (162) out of 82 (283) firms in their small (large) 1975 sample have block holders holding at least 25%; for their small (large) 1986 sample it is 40 (171) out of 56 (280). Also, Franks and Mayer (1994) study a sample of 171 German companies during the late 1980s and find that in 85% of these companies there is a single shareholder that holds at least 25%. 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).

Such pervasive block holding is very different than what is observed in the United States and the United Kingdom. In the United States a survey of stock exchange listed firms in 1984 showed that only 20% of the firms had at least one nonofficer who owned 10% of firm's stock; 13% of the firms were majority owned (see Holderness and Sheehan, 1988).[13] In the United Kingdom the proportion of public limited companies with a majority shareholder is also far

smaller than in Germany (see Edwards and Fischer, 1994). In the case of Germany, it may be that block holders are important because they are more powerful in bargaining with employee representatives on the supervisory board than would be dispersed shareholders. We will investigate the role played for various types of block holders, paying particular attention to their identities, as discussed below.

Another important feature of the German corporate governance system concerns the role of banks. Banks play a much more important role in Germany than in the United States or the United Kingdom, as described in Gorton and Schmid (2000) and Edwards and Fischer (1994). Gorton and Schmid study the effects of bank ownership of control rights on the performance of (nonfinancial) firms. They find that in the 1970s and in the 1980s there is a significant positive relationship between bank control rights holdings and firm performance, measured by the market-to-book ratio of equity. Here we will reexamine this question for the 1990s. Also, as shown by Gorton and Schmid (2000), bank control rights holdings translate into supervisory board seats. As with nonbank block holders, the presence of bank representatives on the supervisory board may be important in bargaining with employees.

Other unique features of the German governance system include proxy voting by banks and the possibility of voting restrictions. In Germany, banks vote the shares of dispersed shareholders in proxy. This would appear to drastically increase the power of banks. But, Gorton and Schmid (2000) test for this effect and do not find it. The authors explain the lack of significance of bank proxy voting in their performance regression by the endogeneity of this variable: proxy voting results from the firms' shareholder structure, which the authors also control for in their regression equations. Data on bank proxy voting is difficult and expensive to come by. As Gorton and Schmid do not find significant effects of proxy voting by banks, we do not pursue this issue here. A similar point can be made about voting restrictions. Voting restrictions, which are rare limits to the voting power of large shareholders, are voted on at annual shareholders meetings. Hence, voting restrictions are endogenous as well when the shareholder structure is controlled for.

Our analysis will take account of the firm's ownership structure, i.e., the holding of equity control rights by various types of agents and the degree of concentration of these control rights. In Section IV we explain how we measure equity control rights and equity control rights concentration.

C. Supervisory Board Composition

As the supervisory board is the central institution affected by codetermination, it is worth examining the identities of the individuals on the board. Table 2 shows the composition of the shareholder representation on the supervisory board (panel 1) and the employee representation on the supervisory board (panel 2). Recall that the size of the supervisory board depends on the number of employees of the company. These data are from a survey dated May 31, 1979, as reported by Gerum, et al. (1988).

With respect to shareholder representation on the supervisory board, other companies without any equity share in the firm have the largest number of seats (18.5% on average). According to Gerum, et al., (1988) these are typically related businesses, such as partners and suppliers. Consultants, such as lawyers and auditors, are next (13.5%). Finally, there are bank and nonbank block holders. About one third of the shareholder representatives do not own stock in the company. Also, some of these groups, such as consultants, would appear to have interests more closely aligned with management than with outside shareholders.

The employees on the board are overwhelmingly workers who are not affiliated with labor unions or works councils (these entities are equally important across the two codetermination regimes). The next largest group, however, consists of labor union representatives that are not actually employees of the company (29%). The third largest group consists of white-collar managers. In order for the employees to successfully influence firm decision-making, these three employee groups must agree.

IV.   The Ownership Structure of German Firms

Our analysis will primarily consist of regressing measures of firm value, leverage, board compensation and other variables on control rights variables and a set of normalizing regressors. The set of control rights variables comprises an indicator variable that is equal to 1 for equal representation (and 0 for one-third representation), and a set of equity control rights variables. In general, we are looking for the influence of codetermination on the measures of firm performance or other firm characteristics. As codetermination is an allocation of control rights in the form of supervisory board seats, the effects of this allocation may depend on how the remaining control rights are allocated. We will define "ownership" in terms of equity control rights, i.e., control rights that emanate from equity ownership. We will also be interested in measuring the size of the largest holder of control rights, effectively a measure of the concentration of ownership. Finally, we will

argue that "ownership" is predetermined; it is not caused by firm performance or by the presence or absence of codetermination.

A. Data

Our data start with a sample consisting of annual observations on the largest 250 German nonfinancial stock corporations during the years 1989-1993, which were traded at the end of this period in at least one of the top-tier markets (amtlicher Handel or geregelter Markt).[14] Details on the construction of the sample are contained in Appendix B. In forming the sample, company size is measured by total assets, based on unconsolidated reports. From the sample of 250 corporations, firms are omitted if they are in financial distress, involved in bankruptcy proceedings, or engaged in mergers.[15] Also omitted are financial holding shells, real estate companies, public transport companies, cooperatives, and Kommanditgesellschaften auf Aktien (KGaAs; a hybrid organizational form between a partnership and a stock corporation). We discarded observations when firms were transformed into stock corporations during the fiscal year in question. Moreover, we dropped firms that are neither subject to equal representation (other than *Montan* codetermination), nor to non-parity representation.[16] This leaves a total of 902 observations for the five-year period analyzed. Due to missing data, not all regressions will have the same number of observations. Also, the number of observations differs across years because new firms enter the sample as they are founded or transformed into stock corporations within the analyzed time period.

Company balance sheet and income data are from unconsolidated annual reports, taken from: Handbuch der deutschen Aktiengesellschaften, edited by Verlag Hoppenstedt & Co., Darmstadt, various issues, published annually. In a few cases we had to resort to the company reports themselves in order to complete the data. Also, we used the company statements as published in Bundesanzeiger (an official publication of the German Ministry of Justice). The equity ownership structure data are from Saling Aktienführer, edited by Verlag Hoppenstedt & Co., Darmstadt, various issues.

Table 3 provides summary information on the dependent variables for the 1993 fiscal year. Of these 186 firms, 63% are subject to equal representation. Board compensation is given as per-capita compensations, obtained by dividing the total compensation of the board by the number of board members. Individual compensation data for board members are not publicly available. Details on the construction of the variables from the accounting data can be found in Appendix C.

B. Ownership of German Firms

Measuring "ownership" in Germany is complicated because pyramiding and cross-shareholding separate cash flow rights (claims to residual cash flows) from control rights in the form of votes. Franks and Mayer (1994) and Emmons and Schmid (1998) discuss these ownership structures in Germany. La Porta, Lopez-de-Silanes, and Shleifer (1999) provide a methodology to make these calculations in the presence of complicated ownership structures.[17] We proceed similarly and calculate the equity control rights held by different parties, taking account of pyramids and cross-shareholding.[18] See Gorton and Schmid (2000) for details.

To measure concentration we look at the fraction of votes controlled by the largest ultimate owner (Emax).[19] This is the simplest, most straightforward measure of concentration of ownership, particularly in Germany where a single large ultimate owner is pervasive. This measure does not require a theory of how large shareholders interact. Thus, we do not rely on a theoretical model as a basis for a concentration measure.[20]

Table 4 provides detail on the distribution of the size of equity control rights allocations. Again, the pervasiveness of block holding is apparent. In the last line of the table it is seen that 63% of the firms have an ultimate owner with at least 50% of the control rights. Families own at least 50% of the control rights in 12% of the firms. Domestic non-financial firms constitute the modal category of largest owner, followed by families, foreign non-financial firms, domestic banks, management, and domestic government entities. These ultimate owners are quantitatively the most important types, and will thus be included in our quantitative analysis, along with the fraction of control rights held by firm insiders, that is management and non-executive employees.

Our tests will take the ownership structure of control rights as exogenous or, at least, predetermined, with respect to firm performance. In other words, we assume that holders of control rights do not purchase their shares in anticipation of the firm performing well. That this is a reasonable assumption is shown in Table 5. Table 5 shows the changes in control that occurred for firms in our sample. A change of control is an instance where the identity of the largest ultimate owner changes. Such instances comprise block trades (a block holder sells its entire block to another investor, possibly of the same ultimate owner type), floating of blocks in the market, or accumulation of previously dispersed shares. The table shows that control changes are rare. The results in the table imply that control in the firm changes, on average, once every 17 years. Thus we conclude that we can treat the shareholder as an exogenous variable in our analysis.[21]

Codetermination itself is essentially exogenous. A firm cannot circumvent the 1976 Codetermination Act (or the 1951 Coal and Steel Codetermination Act) by moving assets to subsidiaries. Codetermination applies to the concern as a whole. A firm belongs to a concern if the parent company is in control of this company. Thus the only way to avoid equal representation is to keep the number of employees below 2,000 through outsourcing, or to run the firm as a partnership. Often, these solutions might be more costly than to grant employees equal representation on the supervisory board.

V. Codetermination and Firm Performance

In this section we empirically investigate the effects of codetermination on firm performance, as measured by the (log of) market-to-book ratio (MTB). 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. With exceptions that are mentioned later, all the regression equations have the same set of independent variables. This standard set of regressors comprises the following variables that represent the firm's control rights structure:

Equal representation: Equal to 1 if there is equal representation on the supervisory board, 0 otherwise.

Insiders: Fraction of equity control rights held by management, other employees, or families.

Banks: Fraction of equity control rights held by domestic banks.

Government: Fraction of equity control rights held by domestic government entities.

Largest shareholder: Maximum fraction of equity control rights held by a single shareholder.

ISIC: Industry affiliation based on International Standard Industrial Classification (United Nations, 1990) where category D (manufacturing) serves as the *numeraire* industry.

To avoid simultaneity problems, all control rights variables are lagged by one year, with the exception of the variable *Equal Representation*. In our regressions, we also include, as a measure of firm size, the log of the firm's stock market capitalization, lagged by one year (SMC). Details about the construction of the variables are contained in Appendix C.

A.   Econometric Methodology

When analyzing the influence of equal representation on the firm, we face the problem of separating the influence of equal representation from the influence of firm size. Large firms tend to have many employees, and consequently, tend to be subject to equal representation. The problem of separating these two influences, size and equal representation, is aggravated by a lack of knowledge about whether firm size has an influence on the firm characteristics of interest (i.e., measures of firm performance and risk), and, if there is such an influence, what the nature of this influence is. We therefore estimate a semi-parametric model, in which firm size is included in the nonparametric part, while all other (nonconstant) explanatory variables are in the parametric part. This way we can "purge" the data from the influence of firm size, before estimating the influence of equal representation. In other words, we let the effects of firm size be as nonlinear as possible and allow this nonlinear relationship to explain as much variation in the dependent variable as possible. To be conservative with respect to the potential influence of codetermination, we prefer to err on the side of over-fitting, i.e., to err on the side of ascribing variation of the dependent variable to the influence of firm size rather than to the firm's codetermination regime.

For each year in our dataset, we estimate a semi-parametric regression equation of the form:

$$y_i = f(z_i) + X_i\beta + \varepsilon_i \qquad\qquad (1)$$

with y_i being an observation of the dependent variable for firm i $(i = 1,...,n)$. The regressor z_i represents the size of firm i, which (along with the intercept) is included in the nonparametric part. The (row) vector X_i comprises the observations of firm i that are contained in the parametric part, and ε_i is an error term.

We estimate Eq. (1) following Speckman (1988). In the first step, we smooth the dependent variable vector, y, on firm size, z. The smoother matrix, S, establishes a linear relationship between y and the estimate $\hat{y}$:

$$\hat{y} = S \times y \ . \qquad\qquad (2)$$

We apply the smoother LOESS (locally weighted regression) as developed by Cleveland and Devlin (1988) and Cleveland, Devlin, and Grosse (1988). LOESS estimates the functional form in each observation by defining a neighborhood of q data points around the observation in question. These data points are chosen and weighted based on the Euclidean distance. We use a tricube weight function with quadratic fitting as suggested by Cleveland and Devlin. The fraction of data points that are comprised in the neighborhood, $g = q / n$, is called the smoothing

parameter. We chose a smoothing parameter of 0.7. We also estimated the model with alternative smoothing parameters ($g = 0.4$ and $g = 1$) without obtaining qualitatively different results on the influence of codetermination. Note that a "neighborhood" captures the idea of characteristics of firms that are near the point of interest. This makes sense in cross section, but not in the time series dimension. Therefore, we estimate relationships year by year.

In the second step, we "purge" the dependent variable and the explanatory variables of the parametric part from the influence of firm size, which is contained in the nonparametric part:

$$\widetilde{y} = (I - S) \times y \tag{3a}$$

$$\widetilde{X} = (I - S) \times X \tag{3b}$$

with I being the identity matrix.

In the third step, the vector β is estimated using ordinary least squares:

$$\hat{\beta} = (\widetilde{X}'\widetilde{X})^{-1} \times \widetilde{X}'\widetilde{y} \;. \tag{4}$$

As Speckman (1988) has shown, the bias of the estimator, $\hat{\beta}$, is asymptotically negligible for sufficiently low values of the smoothing parameter, g.

The estimated impact of the explanatory variables in the partially linear model is

$$\hat{f} = S \times (y - X\hat{\beta}) \;. \tag{5}$$

Thus, we obtain as the estimated vector of the dependent variable the following:

$$\hat{\hat{y}} = X\hat{\beta} + \hat{f} \;. \tag{6}$$

It is then straightforward to show that $\hat{\hat{y}}$ is a linear function in y:

$$\hat{\hat{y}} = L_S \times y \tag{7a}$$

with

$$L_S = X(\widetilde{X}'\widetilde{X})^{-1}\widetilde{X}'(I - S) + S_F \tag{7b}$$

$$S_F = S[I - X(\widetilde{X}'\widetilde{X})^{-1}\widetilde{X}'(I - S)] \;. \tag{7c}$$

Based on the linearity shown in Eq. 7a, we use results from Cleveland and Devlin (1988, p. 599) on the distribution of the residuals of LOESS regressions to estimate standard errors for $\hat{\beta}$ as proposed by Speckman (1988, p. 421), and confidence intervals for $\hat{f}$.

B.   Results

The results from the parametric part of the regression results are shown in Table 6. The main variable of interest is *Equal Representation*, which indicates equal representation on the supervisory board in codetermined firms. The important result in the table is that equal representation does affect the value of the firm. For each of the five years, we find a significant negative impact of parity-codetermination on the market-to-book ratio of equity (MTB). Averaged over the five years we analyzed, equal representation reduces MTB by 26 percent.[22] The magnitude of the discount is about the same across all the years. Below, we provide robustness checks.

An equal representation discount of 26 percent is strong evidence that the composition of the supervisory board is important for shareholder value. And, keep in mind that this is the discount relative to one-third-employee representation. Control rights in the form of board seats are valuable. The large equal representation discount is consistent with the fierce resistance to the introduction of equal representation to firms in 1976. Germany was thrown into a constitutional crisis. The German Supreme Court ruled that if the law harmed shareholders, then it would be unconstitutional, as it would amount to expropriation. However, according to the court ruling, there are possible offsetting effects, such as employees being better off.

The impact of the ownership structure on firm performance is also interesting. Confirming the results of Gorton and Schmid (2000), bank ownership of control rights has a significant positive effect in 1989-1991, but is insignificant in 1992 and 1993. Insiders' ownership of control rights is significantly positive in each year except 1989. Similarly, the largest shareholder improves performance significantly, except in 1993. To the extent that the government owns control rights, performance suffers.

C.   Robustness

The influences of equal representation codetermination and firm size may be hard to separate, but is not impossible. The above results relied on semiparametric regression to separate the influences of equal representation and firm size in a reliable manner. We allow firm size to explain as much variation in the dependent variable as the smoothing parameter permits.

However, one disadvantage of the approach is that each year must be treated separately. Table 7 presents the results of treating the sample as an unbalanced panel, and including size linearly. Also, three measures of firm size are used: stock market capitalization (lagged by one year), sales (in 1991 German marks), and the number of employees. The results for all three measures confirm the previous findings with respect to the affect of equal representation and also for the effects of different types of blockholders.[23]

D.   Explaining the Effects of Equal Representation

When firms have equal representation, their performance suffers, as measured by the market-to-book ratio. Conceptually, there are two nonmutually exclusive explanations for this phenomenon. One is that employees are taking more of the firm's surplus when they have equal representation on the supervisory board. The other is that employees change the objective function of the firm with equal representation, that is, employees use the firm as an insurance mechanism by forcing shareholders to bear more systematic risk, for example, by resisting wage cuts and layoffs in recessions. As a practical matter, it is difficult to separate the two explanations of employees taking more surplus and employees using the firm to provide insurance.

With regard to employee resistance to restructuring, it is important to note that our sample spans the event of the reunification of East and West Germany. Reunification of the two Germanys was one of the largest and most jarring transformations of any major industrialized country in the postwar era. Between 1989, the date our sample starts, and January 1991 (the middle of our sample), reunification went from being inconceivable to being a reality. For background see, e.g., Sinn and Sinn (1992). Because of the fears concerning cheap labor in the former East, the event of reunification offers an excellent opportunity to test possible employee resistance to wage cuts and layoffs.

We first investigate these issues by examining the wage bill-to-sales ratio and the employees-to-sales ratio. The basic idea is that employees at firms with equal representation will, on average, be overpaid and overstaffed, relative to firms with one-third representation. The reason is that employees resist wage cuts and layoffs so that hiring is, to some extent, irreversible—the idea behind Eurosclerosis. This transfers surplus to employees in such a way as to insure them. The results are shown in Tables 8 and 9. Equal representation does, indeed, result in a higher wage bill-to-sales ratio and a higher employee-to-sales ratio.

More direct evidence of employees' using the equal representation firm as an insurance vehicle is somewhat mixed. We investigated whether firms with equal representation are more diversified (conditional on size) by having more lines of business. In unreported results, we found that there is no evidence that equal representation codetermined firms have more lines of business, i.e., are more diversified. Another way to look at the issue is to examine the influence of codetermination on the standard deviation of the firm's weekly stock returns. Controlling for the impact of the level of the firm's total stock return for the year is complicated by the fact that some firms have negative total returns. We thus expect the influence of the total return for the year on the standard deviation of weekly returns to be nonlinear. We included the total return in the nonparametric part of Eq. 1, in addition to firm size. In unreported results, we found that for three of the five analyzed years, codetermination significantly increases the standard deviation of the firm's stock returns. For the years 1989 and 1992 we cannot reject the null hypothesis of no such influence.

VI.   Leverage and Equal Representation

In this section we investigate whether shareholders respond to codetermination by taking counteracting measures. One way to do this might be by altering the firm's capital structure. Shareholders can influence the decision-making of the firm by choice of the capital structure.[24] We investigate firms' leverage as a function of equal representation. Recall the results discussed above concerning the response of U.S. firms to unions. These firms tend to increase leverage.

If employees can affect the real activities of the firm, they must be aware that they cannot affect the debt-equity ratio since that is one important decision that the supervisory board does not make independently. Leverage is voted on by the shareholders at the annual meeting of the firm. If employees reduce the return on equity and make equity stakes riskier, then the shareholders should issue less of it. Also, in response to employees' power and desire to alter the firm's decisions (from what shareholders would otherwise agree to), shareholders may be able to use leverage to reassert their authority over decision-making. For example, if employees alter the mix of the firm's real activities in the direction of less restructuring activity, the shareholders may respond by altering leverage, increasing financial leverage to threaten them with a higher likelihood of default. Also, as with U.S. firms responding to unions, shareholders can increase leverage to commit to paying cash out of the firm, rather than to employees in the form of higher wages. We address these issues by analyzing whether leverage is affected by codetermination.

We measure the influence of codetermination on the firm's capital structure (as chosen by the shareholders at the annual meeting) by regressing the (log of the) debt-equity ratio on the standard set of independent variables. The empirical results are given in Table 10. The regression coefficients representing the influence of codetermination are positive and statistically significant, except for an insignificant coefficient in the year 1992. That is, there is evidence that shareholders use capital structure to mitigate the impacts of codetermination. Employees of parity-codetermined firms are treated similar to unionized workers in the United States.[25]

VII.   Board Member Compensation

When faced with employees on the supervisory board, shareholders may respond by making compensation of board members more sensitive to firm performance. To date there has been little work on board compensation in Germany. As Pistor (1999) writes: "An empirical analysis of codetermined supervisory boards is constrained by the lack of systematic data" (p. 30). There are, however, a few studies. Schwalbach and Grasshoff (1997) use proprietary consulting firm data to look at the relation between managerial pay and performance and find little evidence of sensitivity. Kaplan (1994), however, does find that the elasticity of cash compensation to stock price performance in Germany is roughly comparable to the United States. Neither of these studies examines the issue of codetermination on the compensation of board members. We examine the issue of sensitivity of board member compensation to codetermination in this section.

Recall that there are two boards of directors that oversee German public limited companies, AGs. The supervisory board oversees the management board. Codetermination affects only the supervisory board. Management board compensation is typically explicitly dependent on the performance of the firm. Firm performance is traditionally measured using accounting information. Explicit performance pay for supervisory board members exists, but is rare. This does not preclude the possibility that supervisory board compensation is implicitly performance-sensitive over time and in cross-section.

Shareholders may want to counteract the desire of managers or board member employees to resist restructuring by adopting more performance-sensitive compensation for the agents that are making these decisions. These agents could be the management, the employees, or both groups.

For the board compensation regressions, we again face the problem of separating the influence of codetermination from the influence of firm size. Here the issue is complicated by a

possible interaction between firm size and performance-sensitivity of compensation, as evidenced by Murphy (1998).   Thus, in addition to firm size, we include firm performance in the nonparametric part. LOESS does not only allow for nonlinearities in the influences of individual variables; in contrast to kernel smoothers, for instance, it also allows for interactions among the variables. For example, LOESS can allow the impact of performance on compensation to be nonlinear (holding the influence of firm size constant) and, at the same time, it can allow the influence of firm performance to vary with firm size.

We measure board compensation by the log of compensation per board member. As above, we measure firm size by the (log of the) firm's stock market capitalization, SMC. For firm performance we use the (log of the) market-to-book ratio of equity, MTB. Although compensation of directors with stock options was illegal in Germany for the period we analyze, we chose MTB. Firstly, from the equity holders' point of view it is the firm's stock market performance that matters. Compensation contracts can be linked to variables that are correlated with the firm's stock market performance, even though stock options are not possible. Secondly, using MTB as a performance measure will allow us to compare our results to Kaplan (1994) who analyzed board compensation in Germany using a stock market-based measure of firm performance. Other explanatory variables are: Co, which is equal to 1 for parity-codetermined firms, and 0 otherwise; Co   Perf, which measures changes in the performance-sensitivity of the board compensation; 0/1 variables for industry affiliation, based on ISIC categories (United Nations, 1990).

The results for the management board compensation are shown in Table 11. Panel A covers the management board; panel B covers the supervisory board. For neither of the two boards, nor any of the five years analyzed, can we reject the null hypothesis that codetermination does not make board compensation more sensitive to firm performance.

VIII.   Conclusions

The German codetermination system legally requires firms to allocate supervisory board seats to employees depending on the number of employees in the firm. Codetermination appears to be a binding constraint on shareholders. Shareholders can avoid codetermination only by breaking up the firm into small independent units (which are not united in a group) or by moving to a partnership. Such changes in the organizational form seem to be prohibitively costly for many large German stock corporations. We find that firms with equal representation on the supervisory board have a significant 26 percent decline in the market-to-book ratio, compared to

firms with one-third representation. Employees use their power in equal representation firms to increase the employees-to-sales and wage bill-to-sales ratios, consistent with resistance to firm restructuring. Shareholders attempt to counteract codetermination by increasing the leverage of the firm and by making board member compensation more sensitive to firm performance.

Footnotes

[1] Employees do sometimes own shares. We describe the prevalence of this in our sample and we will take account of this below.

[2] Firm-specific human capital can be substantial. Topel (1990) finds that, in the United States, long-tenured employees that are laid off through no fault of their own (e.g., as a result of a plant closing) typically earn 15% to 25% less on their next jobs. May (1995) finds evidence that older (U.S.) managers, with (presumably) more at stake in their firm, are more likely to engage in diversifying actions. German employees, therefore, may have both the desire and the power to prevent such potential losses.

[3] Control rights are valuable. Voting shares sell at a premium over nonvoting shares. Also, blocks of shares sell for a premium over the single share price. For example, the U.S. Securities and Exchange Commission (1987), examining 26 firms with dual-class stock, found that the low-vote common stock traded at a discount of 4% or 5%. Lease, McConnell and Mikkelson (1983) also looked at dual-class stock and found that the voting stock traded at a 1% to 7% premium. Also, see Lease, McConnell, and Mikkelson (1984), DeAngelo and DeAngelo (1985), and Zingales (1995) who all show that, in the United States, shares with superior voting rights rate at a premium. Also, Zingales (1994) and Barclay and Holderness (1989) study block trades, which transfer control, and find premiums averaging 19% over the post-announcement exchange-quoted price. Vishny and Shleifer (1997) review the evidence for countries other than the United States.

[4] Kaplan (1994) provides some evidence that in Germany the supervisory board does act effectively to remove managers when the firm has not done well.

[5] Adopted after World War II, as described subsequently, by 1955, the German bibliography alone contained more than seven thousand entries (according to Spiro, 1958, p. 1). Arguments for and against codetermination are summarized by Monissen (1978) and Pejovich (1978a,b).

[6] Also see Aoki (1980) and Svejnar (1982c).

[7] For example, shareholders have tried over the years to weaken the power of the supervisory board by removing their ability to make important decisions. (This has been the subject of numerous court cases.)

[8] There is an empirical social psychology literature on employer and employee behavior under codetermination. FitzRoy and Kraft (1993, p. 365) provide a summary of this literature, as follows: "Though successive stages in the development of these [codetermination] laws were bitterly opposed by employers and many economists, subsequent (usually non-quantitative) studies have reached a broad and favorable consensus, crediting codetermination with a significant role in maintaining cooperative labor relations and facilitating technological and structural change." The gist is the conclusion that: "Considerable research in social psychology associates an increase in power sharing with a reduction in alienation and with the removal of restrictions on work effort" (Gurdon and Rai, p. 291). Also, see Blumberg (1968) and Bruyn and Nicolau-Smokovitis (1979).

[9] Let β be the regression coefficient of a 0/1 variable, then the change in the dependent variable as a result of a switch of this indicator variable from zero to one amounts to: $e^{\beta} - 1$. For details see Halvorsen and Palmquist (1980). Based on the regression coefficients presented by FitzRoy and Kraft (1993, Table 2), the aforementioned decrease of 19.7% is thus calculated as follows: $e^{0.13} - e^{-0.06}$.

[10] Another literature that is related concerns workers' cooperatives. In workers' cooperatives there is no issue concerning the allocation of control rights between owners and employees, two groups that may have different objective functions. In cooperatives, the workers are the owners. In the cooperative form of organization, it is perhaps clearer that there will be a difference in behavior compared to the orthodox firm where workers and owners are distinct groups. The evidence suggests that this is the case. See, e.g., Pencavel and Craig (1994), Craig and Pencavel (1992), and Berman and Berman (1989).

[11] See Morck, Shleifer and Vishny (1989) for evidence on the importance of boards in affecting firm value in the United States.

[12] In addition, the milieu in Germany with respect to the power conferred on workers generally is quite different than in the United States or the United Kingdom. For example, in addition to labor unions and codetermined supervisory boards, German firms have works councils. Works councils also participate in decision-making within the firm. They are formally independent of unions. For details see Müller-Jentsch (1995).

[13] This includes firms listed on the New York Stock Exchange, the American Stock Exchange and over-the-counter firms; a total of 5,240 firms.

[14] The remaining market is over-the-counter. Firms that are exclusively traded over-the-counter are not included in our sample.

[15] Financial distress occurs if the absolute value of the firm's loss exceeds the reserves (Rücklagen), i.e., if the book value of equity falls short of its face value.

[16] We eliminated four firms with *Montan*-codetermination and two other firms which special codetermination arrangements. One of these two firms has 15 seats and gives three to workers; the other firm has 21 seats and gives 10 to workers. The former company has some of their power plants located in Switzerland; there is a contract between Switzerland and Germany, which deals with this problem. The second exception is Maingas AG (gas utility). The majority of voting stock is held by the city of Frankfurt a.M. This firm has agreed to increase the number of its employee representatives beyond what is required by law.

[17] Basically, the idea in La Porta, Lopez-de-Silanes, and Shleifer (1999) is to trace the holdings of equity control rights backwards through the ownership chain, basing the final measure of holdings on a critical cut-off level of holdings. For example, suppose party A holds 26% of Firm B's voting shares and Firm B holds 40% of Firm C's voting shares. Then under a 25% cut-off rule, party A is an ultimate owner of Firm C and is assigned a 26% holding of control rights in Firm C. If party A held only 18% of Firm B, then under a 25% cut-off rule, party A would not be an ultimate owner of Firm C. We define the cut-off level to be 25 percent because corporate charters in Germany make this percentage a powerful block. The reason is as follows. At the annual shareholders' meeting, shareholders have the right to: change the corporate charter (including changes to the firm's equity capital); dissolve the company; approve the annual report of the management board; decide on the firm's pay-out via dividends. In general, votes at the annual meeting require a simple majority (50 percent plus one vote). However, changes to the charter (including changes to the equity capital) require approval of at least 75 percent (a "qualified majority") of the votes. A company may, in the charter, set a higher level than three quarters of the votes, but three quarters is the minimum set by law. Most companies follow the 75 percent rule.

[18] Determination of equity control rights in complicated ownership structures (such as pyramids and cross-shareholdings) 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: non-executive employees (EE); management (EM); families, including family-controlled trusts (EF); domestic banks (EB); nonfinancial firms (EN); domestic government entities, including government-controlled trusts or special-purpose banks (EG); foreign banks; domestic and foreign insurers; foreign government entities; trusts not elsewhere classified; domestic and foreign equity funds, including bank-financed venture capital.

[19] La Porta, Lopez-de-Silanes, and Shleifer (1999) define the "ultimate owner" as the agent with a certain minimum percentage of votes after tracing the ownership structure backwards through other entities stops. See Gorton and Schmid (2000) for details of the definition of ultimate owner in Germany.

[20] Our results are not qualitatively changed if we calculate the Herfindahl Index of control rights distribution. The existing theoretical models are not of much use as they are based on probabilistic voting behavior under the assumption of one share-one vote. In addition, these theories are based on environments where all shareholders are alike except that they have differing numbers of votes, e.g., the Shapley-Shubik Power Index (Shapley and Shubik, 1954) or the Banzhaf Index (Banzhaf, 1965, 1968). Also, see Leech (1988), Leech and Leahy (1991), and the references cited therein for further discussion. Basically, the German environment is much more complicated than these models.

[21] There is also the issue of whether the codetermination regime is an influence on the firm's shareholder structure. It may be that when a firm crosses the 2,000-employee threshold (and thus becomes subject to equal representation), the identity of the block holders changes, as well as the size of their blocks. In unreported results, we do not find this to be the case.

[22] Remember that if β is the regression coefficient of a 0/1 variable in a semi-logarithmic model, then the change in the dependent variable as a result of a switch of this indicator variable from zero to one amounts to: $e^{\beta} - 1$ (Halvorsen and Palmquist, 1980).

[23] We also investigated whether leverage is the causal channel through which codetermination lowers the market-to-book ratio. We repeated the original semiparametric performance regression, this time with leverage as an explanatory variable. Note that we can use leverage as an explanatory variable because the performance regression and the leverage regression (shown later in the paper) constitute a recursive system, which can be estimated with OLS. See Greene (1998). In unreported results, this regression confirms the equal representation discount.

[24] Some important decisions are taken at the annual meeting. At this meeting, shareholders have the right to: change the corporate charter (including changes to the firm's equity capital, e.g., issue additional, possibly nonvoting stock); dissolve the company; approve the annual report of the management board; and decide on the firm's payout via dividends. In general, votes at the annual meeting require a simple majority (50% plus one vote). However, changes to the charter (including changes to equity) require approval of at least 75% (a "qualified majority") of the votes. While the supervisory board has important influence on the firm's investment projects, the shareholders at the annual meeting have power over the firm's capital structure by deciding on the firm's dividend policy and the issue of new equity.

[25] Another possible countermeasure concerns the concentration of the equity control rights. Bargaining with employees on the supervisory board and overseeing management outside of the formal channel of the board structure may be more effective if the equity control rights are more concentrated. In unreported results, we found that equal representation is not a significant determinant of the size of the largest shareholder. This finding is consistent with our earlier point that it is difficult to trade equity in Germany and blocks seem to be the product of firm specific events in the past.

Appendix A: On Codetermination

Codetermination (Mitbestimmung) stands for employee representation on the supervisory board. Frequently, codetermination is used synonymously with equal representation, which means that there are equal numbers of shareholder and labor representatives. Though the laws have been modified over the years, all corporations in Germany are governed by at least one of the following five laws:

- *Montan-Mitbestimmungsgesetz* (Coal and Steel Codetermination Act), adopted May 21, 1951;

- *Betriebsverfassungsgesetz* (Industrial Constitution Act), adopted October 11, 1952;

- *Mitbestimmungsergänzungsgesetz* (Amendment to the Coal and Steel Codetermination Act), adopted August 7, 1956;

- *Mitbestimmungsgesetz* (Codetermination Act), adopted May 4, 1976;

- *Aktiengesetz* (Stock Corporation Act), adopted September 6, 1965.

Codetermination in the post-WW II period started with the Coal and Steel Codetermination Act in 1951. This act mandates equal representation for a set of corporations in the coal and steel industries. This set was defined after World War II and has shrunk since through bankruptcies and mergers to only a handful of companies. The second law, the Industrial Constitution Act (1952), extended codetermination to all corporations, requiring that a third of the seats be given to employee representatives (see section 76 paragraph 6 and s 81 para 1). In 1976, equal representation was extended from coal and steel to corporations of all other industries; however, unlike in coal and steel, the chairman was given a second, tie-breaking vote. The Amendment to the Coal and Steel Codetermination Act of 1956 supplements the 1951 Coal and Steel Codetermination Act; it regulates codetermination within groups of affiliated firms.

Section 76, paragraph 1, of the Industrial Constitution Act assigns one-third of the supervisory board seats of stock corporations to employee representatives. Section 76, paragraph 6, exempts from codetermination family-owned stock corporations with less than 500 employees. To be exempt from codetermination, it is required that the company be owned by a single individual or—if there are multiple shareholders—that the shareholders are relatives or in-laws. Section 81, paragraph 1, exempts from codetermination corporations that pursue political goals or are related to the labor movement; it also exempts corporations that pursue religious, charitable, educational, scientific, artistic, or similar interests.

The Coal and Steel Codetermination Act supersedes section 76, paragraph 6, of the Industrial Constitution Act. The minimum number of supervisory board seats is 11. The corporation may increase the number of seats to 15 if the face value of equity exceeds DM 20 million, or to 21 if the face value of equity exceeds DM 50 million. An eleven-member supervisory board consists of four representatives of the

shareholders and a further member; four representatives of the employees and a further member; a further member who is called neutral member. The "further" members are not allowed to be representatives of labor unions or employer associations; they are not allowed to have economic relationships with or interests in the firm. Basically, each side elects five members. The so-called neutral member is nominated by (the remainder of) the supervisory board and elected by the same committee that elects all other board members. For supervisory boards with 15 or 21 members, the same proportions apply; there is always one neutral member.

Codetermination based on the Coal and Steel Codetermination Act is the regime that grants workers a representative on the firm's management board. This representative is called labor director ("Arbeitsdirektor") and, as any other member of the management board, is appointed by the supervisory board. Unlike other members of the management board, the labor director cannot be appointed against the will of the majority of employee representatives.

The Codetermination Act of 1976 applies to all corporations with regularly more than 2,000 employees that are not subject to the Coal and Steel Codetermination Act. Half the members of the supervisory board are employee representatives, the other half are shareholder representatives. The number of seats on the supervisory board is equal to 12 if the number of employees regularly does not exceed 10,000; 16 if the number of employees regularly exceeds 10,000 but does not exceed 20,000; 20 if the number of employees regularly exceeds 20,000. The Codetermination Act (as the Industrial Constitution Act) exempts from codetermination corporations that pursue political goals or are related to the labor movement; also exempt are corporations that pursue religious, charitable, educational, scientific, artistic, or similar interests. Furthermore, corporations in the media industry are exempt from codetermination in accordance with the constitutional freedom of self-expression.

Election of the supervisory board chairman and vice-chairman requires majorities of two-thirds of the votes. If the candidates fail to garner the necessary votes, the shareholder representatives elect the chairman and the employee representatives elect the vice-chairman. This voting scheme ensures that the chairman always is a shareholder representative. The chairman is endowed with an extra, tie-breaking vote, which becomes operational in a repeatedly tied ballot.

According to the Stock Corporation Act of 1965, the supervisory board consists of three members or multiples thereof. The number of board seats may not exceed nine if the face value of equity does not top DM 3 million; 15 if the face value of equity surpasses DM 3 million but does not top DM 20 million; 21 if the face value of equity exceeds DM 20 million. The Stock Corporation Act does not take priority over codetermination acts.

Appendix B: Data Sources and Construction

The sample consists of the largest 250 stock corporations in Germany that traded at the end of the year 1993 in at least one of the two top-tier market segments: *amtlicher Handel* or *geregelter Markt*. In forming the sample, company size was measured by total assets. The sample does not include:

- *Kommanditgesellschaften auf Aktien* (KGaAs; a hybrid organizational form between a partnership and a stock corporation);
- Financial firms (banks, insurance companies, brokerage firms, financial holding shells);
- Public transportation operators;
- Real estate businesses;
- Companies of benefit to the public or with cooperative character;
- Companies that are in the state of liquidation or that have filed a petition for bankruptcy.

From the list of 250 corporations we drop firms if:

- The company is subject to *Montan* codetermination, follows special codetermination arrangements, or is not subject to codetermination at all.
- The company is in financial distress in at least one of the five sample years. Financial distress occurs if the absolute value of the firm's loss exceeds the reserves.
- The company underwent post-merger restructuring during the sample period.

Moreover, if firms transform to stock corporations, the observations of the transformation year and the years prior to it are discarded.

We analyze the first fiscal year that ends in a given calendar year. (If there are incomplete fiscal years, there may be two fiscal years ending in one calendar year.) We analyze the unconsolidated reports. When we look at incomplete fiscal years we scale sales and board compensation to 12-month values.

The number of observations varies by the regression approach. This is because some of the sample firms transform from partnerships to stock corporations during the analyzed period. Another reason is missing data for some of the variables, which is particularly acute for board compensation on the following grounds:

- Board compensation data are not reported in <u>Saling Aktienführer</u>, <u>Handbuch der deutschen Aktiengesellschaften</u>, <u>Bundesanzeiger</u>, or the company report;
- Board compensation includes payments for previous years at amounts that are not reported;
- Board compensation is delayed to later years and the amounts are not reported;
- The board is (in full or in part) compensated by the parent company at an unknown amount.

The equity ownership structure data are from <u>Saling Aktienführer</u>, ed. by Verlag Hoppenstedt & Co., Darmstadt, various issues. These are annual volumes. The information is based on September 30th of each year. Annual reports are taken from: <u>Handbuch der deutschen Aktiengesellschaften</u>, ed. by Verlag Hoppenstedt & Co., Darmstadt, various issues. These volumes are published annually. In a few instances we had to resort to the company reports themselves in order to complete the data. Also, we used the company statements as published in <u>Bundesanzeiger</u>, an official publication of the German Ministry of Justice.

Appendix C: Definitions of Variables

This appendix explains how the variables were calculated. For details on German accounting see, for instance, Ordelheide and Pfaff (1994).

Definition of Dependent Variables

(1)   *Market-to-book ratio of equity (MTB).* The numerator is the end-of-calendar-year market value of equity, aggregated over all categories of stock. There are a few firms for which not all categories of stock are traded. Non-traded shares are either standard voting stock (when only nonvoting stock is traded) or stock with multiple votes (when stocks with single votes are traded). In these instances, we price non-traded shares the same as traded shares. This is because there is no straightforward way of pricing such non-traded shares, which differ in liquidity and voting rights endowment.

The numerator is the end-of-calendar year book value of equity. For firms with other than calendar fiscal years the book value was linearly interpolated.

The book value of equity is calculated as follows:

>   Gezeichnetes Kapital (subscribed capital)
>
> -   Ausstehende Einlagen auf das Kapital (unpaid contributions on subscribed capital)
> +   Rücklagen (reserves)
> -   Rücklagen für eigene Anteile (reserves held against own shares)
> +   Genußscheinkapital (participation certificates, if payments to these securities are included in the result of ordinary business activity)
> + $0.5 \times$ Sonderposten mit Rücklageanteil (special item with a reserve component).

The "special item with a reserve component" is a pre-tax item and is thus part equity, part tax liability. The effective tax rate depends on actual income and the way the company smoothes income over time through contributions to provisions. We follow the usual academic and practitioner procedure and use 0.5 as a proxy for the actual tax rate.

Participation certificates are securities that come with a wide variety of specifications. In some cases, these securities are very similar to preferred stock, while in other cases they are close to bonds with fixed interest payments. We define them as equity if the payments to these securities are made from residual income. Otherwise they are considered debt.

(2)   *Leverage.* Debt-to-equity ratio, based on end-of-fiscal-year values. Debt is liabilities with stated maturity. Equity is calculated as described above.

(3)   *Board compensation*. Management board and supervisory board compensation is measured on a per-capita basis. Compensation data for individual board members is not publicly available. Members of the management board (and less frequently, members of the supervisory board) of large firms tend to hold board seats in subsidiaries. Because we analyze unconsolidated reports, we subtract compensation received from subsidiaries. We subtract license fees and severance pay to management board members. We subtract compensation paid for previous years and add it to the respective years.

(4)   *Employees-to-sales ratio*. Generally, the number of employees refers to the end of the fiscal year; less frequently, published employee numbers are fiscal-year averages, where part-time employees are weighted according to their nominal work hours. Sales numbers refer to the (last) fiscal year that ends in the respective calendar year. For incomplete fiscal years, sales numbers were scaled to 12-month values. Sales and numbers of employees were taken from the unconsolidated reports. We used the ratio in logarithmic form.

(5)   *Wage bill-to-sales ratio*. Wage bill and sale refer to unconsolidated reports, as do all data used in this study. We used the ratio in logarithmic form.

Definition of Explanatory Variables

Leverage, as measured by the debt-to-equity ratio, also serves as a dependent variable in a recursive model. For a description see above.

(1)   *Equal Representation*. Equal to 1 if the firm is subject to equal representation on the supervisory board; 0 otherwise.

(2)   *Stock market capitalization*. Numerator of market-to-book ratio of equity (described above), measured in units of 1 German mark. Measure of firm size.

(3)   *Sales*. Sales are measured in units of 1 German mark and deflated by the CPI (1991 German marks). Measure of firm size.

(4)   *Number of employees*. Generally, the number of employees refers to the end of the fiscal year; less frequently, published employee number are fiscal-year averages, where part-time employees are weighted according to their nominal work hours. Measure of firm size.

(5)   *Insiders*. Fraction of equity control rights held by management, other employees, or (domestic or foreign) families. If families hold equity stakes indirectly (through other nonfinancial firms) in firms in which they are represented on the supervisory board, the stakes are categorized as family-controlled; otherwise the stakes are categorized as controlled by nonfinancial firms.

(6) *Banks*. Fraction of equity control rights held by domestic banks. Government-controlled special-purpose banks (e.g., Kreditanstalt für Wiederaufbau; Bayerische Landesanstalt für Aufbaufinanzierung) are not included; instead, they are classified as government entities.

(7) *Government*. Fraction of equity control rights held by domestic government entities, including government-controlled special-purpose banks.

(8) *Largest shareholder*. Maximum fraction of equity control rights held by a single shareholder.

(9) *ISIC*. Industry affiliation based on International Standard Industrial Classification (United Nations, 1990).

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Table 1

Fraction of employees by codetermination type. Employees fall into the category of so-called dual codetermination if their employers have both works councils (codetermination on the shop-floor level) and equal representation on the supervisory board. Equal representation on the supervisory board may be *Montan* codetermination or parity codetermination according to the 1976 Codetermination Act. Employees are assigned to the so-called single codetermination regime if their employers have works councils but are not subject to equal representation on the supervisory board. Companies without equal representation on the supervisory board may be subject to 1/3 codetermination according to the 1976 Codetermination Act or have no labor representation on the supervisory board. Employees are assigned to a regime of no codetermination if their employers have neither works councils nor equal representation on the supervisory board. The public sector generally has representation on the shop-floor level, but supervisory boards do not exist. Media companies and many nonprofit organizations are exempt from codetermination due to the constitutional freedoms of expression and faith. Kommission Mitbestimmung (1998) compiled these numbers from multiple sources, some of which refer to 1994, while others refer to 1996.

Fraction of Employees by Codetermination Type		
Panel A: Private Sector		
Codetermination Type	1984	1994/96
Dual Codetermination	30.5	24.5
Single Codetermination	18.9	15.0
No Codetermination	50.6	60.5
Total (Percent)	100	100
Panel B: Whole Economy (Private, Public, and Nonprofit Sectors)		
Codetermination Type	1984	1994/96
Dual Codetermination	22.2	18.2
Single Codetermination	40.8	36.9
No Codetermination	37.0	44.9
Total (Percent)	100	100

Table 2

Composition of supervisory boards with equal representation, broken down by board size and type of board member for a sample of firms compiled by Gerum, Steinmann, and Fees (1988). Panel A: shareholder representatives. Panel B: employee representatives. In each panel, column 1 represents firms with not more than 10,000 employees (board size is 12 members); column 2 contains firms with 10,000 employees or more, but not more than 20,000 (board size is 16 members); column 3 represents firms with more than 20,000 employees (board size is 20 members). Column 4 displays the sample average. Shareholder representatives and employee representatives each occupy half of the seats on supervisory boards with equal representation (as required by the 1976 Codetermination Act). Neither shareholder representatives nor employee representatives have to be shareholders or employees in person. The data is from the year 1979. Sums of percentages by column may differ from 100 due to rounding.

Panel A: Shareholder Representatives				
Size of Supervisory Board	(1) 12 Members	(2) 16 Members	(3) 20 Members	(4) Sample Average
Percentage of seats by type of shareholder representative				
Individual shareholders	9.3	3.9	1.8	5.7
Shareholder association	1.2	1.8	1.9	1.5
Representatives of companies with >50% equity stakes	14.6	14.6	10.1	13.1
Representatives of companies with <50% equity stakes	7.8	11.6	6.3	8.1
Representatives of banks with >50% equity stakes	0.5	2.1	0.2	0.7
Representatives of banks with <50% equity stakes	3.6	7.7	3.5	4.4
Representatives of foreign companies	8.6	4.3	2.9	5.9
Representatives of government entities with equity stakes	2.5	11.4	24.6	11.7
Representatives of companies without equity stakes	17.2	17.1	21.2	18.5
Representatives of banks without equity stakes	13.1	8.6	10.4	11.3
Former members of the management board	4.0	5.0	3.8	4.2
Consultants	17.0	10.9	10.3	13.5
Representatives of government entities without equity stakes	0.6	1.1	2.9	1.5
Total	100	100	100	100
Number of observations	158	55	68	281

Table 2 (cont'd)

Size of Supervisory Board	(1) 12 Members	(2) 16 Members	(3) 20 Members	(4) Sample Average
Panel B: Employee Representatives				
Percentage of seats by type of employee representative				
Members of company workers' councils	2.6	4.2	5.0	4.6
Chairman of the workers' council	1.6	2.7	1.6	1.8
Member of subsidiary's workers' council	3.3	5.7	8.1	5.4
Non-members of workers' council	3.1	3.0	2.5	2.9
White-collar employees with managerial functions	16.7	12.7	10.3	13.7
Non-employee labor union representatives	31.5	23.6	29.0	29.0
Employee labor union representatives	1.6	1.4	0.4	1.2
Other employees	60.4	53.3	56.9	58.6
Total	100	100	100	100

Table 3

Summary measures of dependent variables. Due to missing values, the number of observations differs across variables. Market-to-book ratio of equity, MTB, is calculated for the end of the calendar year 1993 (186 observations). Leverage (measured by the debt-to-equity ratio) is calculated for the fiscal year 1993 (or 1992/1993 for firms with other than calendar fiscal years); the number of observations equals 186. The per-member compensation of the management and the supervisory boards (171 observations) are for the fiscal year 1993 (or 1992/1993 for firms with other than calendar fiscal years), measured in units of DM 1,000. Sources: Saling Aktienführer, various issues, Darmstadt, Germany: Hoppenstedt & Co.; Handbuch der deutschen Aktiengesellschaften, various issues, Darmstadt: Hoppenstedt & Co.

	Minimum	Median	Mean	Maximum	Standard Deviation
Market-to-book ratio of equity (MTB)	0.002	2.290	2.769	14.625	1.880
Leverage (debt-to-equity ratio)	0.050	0.685	1.109	20.875	1.883
Management board compensation (per member)	151	583	655	2,324	309
Supervisory board compensation (per member)	3.9	22.5	30.9	155.5	25.1

Table 4

Distribution of ultimate owners by size of block of equity control rights. Ultimate owners are shareholders that are viewed as agents in control of their equity stakes, as opposed to financial holding shells, which are simply control vehicles. Blocks are not added up for each type of ultimate owner, i.e., if a firm has two bank block holders they count as two observations. The cases listed in column 5 (largest shareholder) are not mutually exclusive, because of ties. The observations are from September 30, 1992, which is the last year for which we collected equity ownership data. Source: Saling Aktienführer 1993, Darmstadt, Germany: Hoppenstedt & Co., 1992.

Type of Ultimate Owner	Number (Percentage) of Firms				
Size of Block	(1) ≥ 0.05	(2) ≥ 0.25	(3) ≥ 0.5	(4) ≥ 0.75	(5) Largest Shareholder
Management	18 (10)	13 (7)	10 (5)	2 (1)	15 (8)
Families, incl. trusts	44 (23)	31 (17)	22 (12)	10 (5)	30 (16)
Banks, domestic	40 (22)	24 (13)	4 (2)	2 (1)	18 (10)
Banks, foreign	1 (1)	1 (1)	0 (0)	0 (0)	0 (0)
Nonfinancial firm, domestic	97 (52)	87 (47)	63 (34)	36 (19)	73 (39)
Nonfinancial firm, foreign	26 (14)	23 (12)	20 (11)	16 (9)	23 (12)
Government entities, incl. trusts, domestic	18 (10)	11 (6)	9 (5)	2 (1)	11 6)
Government, incl. trusts, foreign	2 (1)	0 (0)	0 (0)	0 (0)	1 (1)
Insurers, domestic	23 (12)	10 (5)	2 (1)	2 (1)	9 (5)
Insurers, foreign	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Trusts (not elsewhere classified)	1 (1)	1 (1)	0 (0)	0 (0)	1 (1)
Private equity fund, domestic	3 (2)	2 (1)	2 (1)	0 (0)	2 (1)
Private equity fund, foreign	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)
Largest shareholder	177 (95)	159 (85)	117 (63)	52 (28)	---
Number of firms	186				

Table 5

Control changes in firms by type of transaction. We measured control changes as changes in the identity of the shareholder with the largest fraction of equity control rights. The table covers the period 1987-1992, where 1992 is the last year for which we collected equity ownership data. The ownership information dates from September 30 of the respective years. For example, column 1 compares the equity ownership data from September 30, 1988 to the same day in 1987. Note that most trades are block trades, i.e., a large shareholder sells its entire block to one (or sometimes two) other investor(s). The number of possible transactions (last row) is the number of firms that are included in the sample in both of two neighboring years. Source: Saling Aktienführer, 1988-1993 issues, Darmstadt, Germany: Hoppenstedt & Co., 1987-1992.

Type of Transaction	(1) 1987-1988	(2) 1988-1989	(3) 1989-1990	(4) 1990-1991	(5) 1991-1992	(6) 1987-1992
Family sells to family	1	1	0	1	0	3
Family sells to bank	0	0	0	0	0	0
Family sells to nonfinancial firm	1	2	2	0	0	5
Bank sells to family	0	0	0	0	0	0
Bank sells to bank	0	0	0	0	0	0
Bank sells to nonfinancial firm	0	4	2	2	0	8
Nonfinancial firm sells to family	0	0	1	0	0	1
Nonfinancial firm sells to bank	2	0	0	4	0	6
Nonfinancial firm sells to nonfinancial firm	2	2	6	2	4	16
Government floats block (privatization)	1	0	0	0	0	1
Family floats block	0	0	1	1	0	2
Investor accumulates dispersed shares	1	2	2	0	0	5
Other transactions	1	1	2	0	1	5
Total	9	12	16	10	5	52
Number of possible transactions	172	173	177	180	185	887

Table 6

Firm performance and control rights allocation. The regression model is of the semi-parametric type $y_i = f(z_i) + x_i\beta + \varepsilon_i$ where y_i denotes the performance of firm i. The variable z_i represents the size of firm i, which (along with the intercept) is included in the nonparametric part. The (row) vector x_i comprises the observations of firm i of the variables in the parametric part, and ε_i is an error term. The parametric part includes equity control rights variables and indicator variables for industry affiliation; equity control rights variables are lagged by one year. The regression coefficients of the variables of the parametric part are displayed in the table; to preserve space, plots of the effect of firm size on firm performance (as modeled in the nonparametric part) are not shown. Data are annual observations. Firm performance is measured by (the log of) the market-to-book ratio of equity, MTB. Firm size is measured by stock market capitalization, lagged by one year. *Equal representation*: Equal to 1 if there is equal representation on the supervisory board, 0 otherwise. *Insiders*: Fraction of equity control rights held by management, other employees, or families. *Banks*: Fraction of equity control rights held by domestic banks. *Government*: Fraction of equity control rights held by domestic government entities. *Largest shareholder*: Maximum fraction of equity control rights held by a single shareholder. *ISIC*: Industry affiliation based on International Standard Industrial Classification (United Nations, 1990) where category D (manufacturing) serves as the *numeraire* industry. Standard errors are corrected following White (1980); *t*-statistics significance levels (in two-tailed tests): * denotes 10% level, ** denotes 5% level, and *** denotes 1% level. The R² of this semi-parametric regression model is the ratio of regression sum of squares and the sum of regression sum of squares and error sum of squares. The effect of equal representation on firm performance is calculated following Halvorsen and Palmquist (1980): $e^{\beta} - 1$ where β is the regression coefficient of the respective indicator variable. For the year 1989, for instance, we find that equal representation depressed the market-to-book value of equity by 16.4%.

Dependent Variable: Market-to-Book Ratio

Year	(1) 1989		(2) 1990		(3) 1991		(4) 1992		(5) 1993	
Explanatory Variable	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic
Equal representation	$-1.793 \cdot 10^{-1}$	-2.079**	$-2.401 \cdot 10^{-1}$	-2.586***	$-2.437 \cdot 10^{-1}$	-2.713***	$-4.649 \cdot 10^{-1}$	-4.515***	$-3.340 \cdot 10^{-1}$	-3.363***
Insiders	$2.055 \cdot 10^{-1}$	1.428	$2.856 \cdot 10^{-1}$	1.981**	$3.233 \cdot 10^{-1}$	1.990**	$4.846 \cdot 10^{-1}$	2.998***	$2.603 \cdot 10^{-1}$	1.905*
Banks	$5.713 \cdot 10^{-1}$	3.131***	$4.810 \cdot 10^{-1}$	2.280**	$3.897 \cdot 10^{-1}$	1.738*	$2.340 \cdot 10^{-3}$	0.011	-1.019	-1.151
Government	$-7.511 \cdot 10^{-1}$	-2.724***	$-9.595 \cdot 10^{-1}$	-3.451***	$-6.856 \cdot 10^{-1}$	-2.458**	$-4.754 \cdot 10^{-1}$	-1.880*	$-6.040 \cdot 10^{-1}$	-1.791*
Largest shareholder	$2.615 \cdot 10^{-1}$	2.428**	$3.484 \cdot 10^{-1}$	2.785***	$4.775 \cdot 10^{-1}$	3.325***	$2.977 \cdot 10^{-1}$	2.045**	$-2.811 \cdot 10^{-1}$	-0.861
ISIC A	$9.664 \cdot 10^{-2}$	1.096	$1.330 \cdot 10^{-1}$	1.440	$1.771 \cdot 10^{-1}$	1.643	$1.423 \cdot 10^{-1}$	1.348	$3.177 \cdot 10^{-1}$	2.885***
ISIC C	$4.932 \cdot 10^{-1}$	1.579	$7.782 \cdot 10^{-1}$	2.524**	$4.749 \cdot 10^{-1}$	1.283	$4.425 \cdot 10^{-1}$	1.579	$3.297 \cdot 10^{-1}$	1.640
ISIC E	$1.322 \cdot 10^{-1}$	0.912	$3.631 \cdot 10^{-1}$	2.310**	$2.801 \cdot 10^{-1}$	2.012**	$1.960 \cdot 10^{-1}$	1.566	$2.455 \cdot 10^{-1}$	1.631
ISIC F	$1.280 \cdot 10^{-1}$	1.194	$3.054 \cdot 10^{-1}$	3.362***	$3.104 \cdot 10^{-1}$	3.580***	$3.568 \cdot 10^{-1}$	4.168***	$1.668 \cdot 10^{-1}$	1.088
ISIC G	$-2.152 \cdot 10^{-1}$	-1.864*	$-9.672 \cdot 10^{-2}$	-0.834	$-8.104 \cdot 10^{-3}$	-0.089	$6.590 \cdot 10^{-2}$	0.587	$4.153 \cdot 10^{-2}$	0.367
ISIC H	$6.181 \cdot 10^{-1}$	6.574***	$9.504 \cdot 10^{-1}$	10.373***	1.315	13.519***	1.334	11.124***	1.363	9.977***
ISIC I	$-3.743 \cdot 10^{-1}$	-4.993***	$-1.744 \cdot 10^{-1}$	-1.413	$-3.948 \cdot 10^{-2}$	-0.161	$-2.056 \cdot 10^{-1}$	-0.782	$-1.276 \cdot 10^{-1}$	-0.604
ISIC K	$7.015 \cdot 10^{-1}$	2.512**	$5.701 \cdot 10^{-1}$	4.984***	$6.330 \cdot 10^{-1}$	5.197***	$1.230 \cdot 10^{-1}$	0.505	$-5.849 \cdot 10^{-2}$	-0.238
ISIC N	---	---	---	---	---	---	$-7.216 \cdot 10^{-2}$	-0.514	$2.640 \cdot 10^{-1}$	2.025**
R²	0.228		0.289		0.270		0.346		0.125	
Effect of equal rep.	-0.164		-0.213		-0.216		-0.372		-0.284	
Number of observations	173		177		180		186		186	

Table 7

Firm performance and control rights allocation. Data are annual observations, pooled over sample firms and fiscal years 1989-1993. The panel is unbalanced. The regression model is linear. Firm performance is measured by (the log of) the market-to-book ratio of equity, MTB. *Equal representation*: Equal to 1 if there is equal representation on the supervisory board, 0 otherwise. *Firm size*: Alternatively, stock market capitalization (lagged by one year), sales (in 1991 German marks) or number of employees. *Insiders*: Fraction of equity control rights held by management, other employees, or families. *Banks*: Fraction of equity control rights held by domestic banks. *Government*: Fraction of equity control rights held by domestic government entities. *Largest shareholder*: Maximum fraction of equity control rights held by a single shareholder. *ISIC*: Industry affiliation based on International Standard Industrial Classification (United Nations, 1990) where category D (manufacturing) serves as the *numeraire* industry. Sample years are represented by indicator variables where 1993 serves as the *numeraire* year. Standard errors are corrected following Newey-West (1987); *t*-statistics significance levels (in two-tailed tests): * denotes 10% level, ** denotes 5% level, and *** denotes 1% level. The effect of equal representation is the product of the regression coefficient of the interaction term *Equal representation × Firm size* (which, for instance, equals $-1.249 \cdot 10^{-2}$ for 1989) and the median value of firm size in the subsample of codetermined firms of the respective year.

Dependent Variable: Market-to-Book Ratio						
	(1)		(2)		(3)	
Firm Size	Stock Market Capitalization		Sales		Employees	
Explanatory Variable	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic
Equal representation × Firm size	$-1.249 \cdot 10^{-2}$	-3.982***	$-1.028 \cdot 10^{-2}$	-2.139**	$-1.787 \cdot 10^{-2}$	-2.274**
Firm size	$1.018 \cdot 10^{-1}$	3.499***	$-9.167 \cdot 10^{-3}$	-0.557	$-3.933 \cdot 10^{-3}$	-0.278
Insiders	$3.331 \cdot 10^{-1}$	3.373***	$3.003 \cdot 10^{-1}$	2.747***	$2.706 \cdot 10^{-1}$	2.552**
Banks	$2.803 \cdot 10^{-1}$	1.662*	$4.779 \cdot 10^{-1}$	3.430***	$3.348 \cdot 10^{-1}$	2.005**
Government	$-6.642 \cdot 10^{-1}$	-3.783***	$-7.100 \cdot 10^{-1}$	-3.825***	$-6.512 \cdot 10^{-1}$	-3.629***
Largest shareholder	$4.184 \cdot 10^{-1}$	4.925***	$3.201 \cdot 10^{-1}$	3.616***	$3.919 \cdot 10^{-1}$	4.572***
ISIC A	$2.679 \cdot 10^{-1}$	2.892***	$2.644 \cdot 10^{-1}$	2.874***	$2.945 \cdot 10^{-1}$	3.037***
ISIC C	$5.762 \cdot 10^{-1}$	2.797***	$6.772 \cdot 10^{-1}$	3.481***	$6.487 \cdot 10^{-1}$	3.375***
ISIC E	$2.951 \cdot 10^{-1}$	2.993***	$3.991 \cdot 10^{-1}$	3.500***	$3.679 \cdot 10^{-1}$	3.621***
ISIC F	$3.481 \cdot 10^{-1}$	5.417***	$3.533 \cdot 10^{-1}$	5.468***	$4.159 \cdot 10^{-1}$	6.154***
ISIC G	$-2.738 \cdot 10^{-2}$	-0.493	$-1.266 \cdot 10^{-1}$	-2.374***	$-5.738 \cdot 10^{-2}$	-1.038
ISIC H	1.161	8.138***	1.026	6.724***	1.094	7.083***
ISIC I	$-1.783 \cdot 10^{-1}$	-1.333	$-1.929 \cdot 10^{-1}$	-1.515	$-1.690 \cdot 10^{-1}$	-1.271
ISIC K	$5.151 \cdot 10^{-1}$	4.912***	$5.609 \cdot 10^{-1}$	3.748***	$6.830 \cdot 10^{-1}$	5.002***
ISIC N	$3.432 \cdot 10^{-1}$	3.032***	$3.525 \cdot 10^{-1}$	3.191***	$4.057 \cdot 10^{-1}$	3.403***
1992	$-2.315 \cdot 10^{-1}$	-3.908***	$-2.553 \cdot 10^{-1}$	-5.454***	$-2.176 \cdot 10^{-1}$	-3.648***
1991	$-2.685 \cdot 10^{-2}$	-0.482	$-5.665 \cdot 10^{-2}$	-1.496	$-2.153 \cdot 10^{-2}$	-0.393
1990	$6.436 \cdot 10^{-2}$	0.990	$3.982 \cdot 10^{-2}$	0.776	$7.907 \cdot 10^{-2}$	1.247
1989	$2.324 \cdot 10^{-1}$	3.836***	$1.736 \cdot 10^{-1}$	3.448***	$2.226 \cdot 10^{-1}$	3.464***
Constant	-1.383	-2.566**	$8.131 \cdot 10^{-1}$	3.857***	$6.432 \cdot 10^{-1}$	6.156***
F-statistic	16.36***		17.26***		14.22***	
R^2 adj.	0.240		0.273		0.222	
Effect of equal representation	-0.259		-0.143		-0.145	
Number of observations	902		802		860	

Table 8

Employees-to-sales ratio and control rights allocation. The regression model is of the semi-parametric type $y_i = f(z_i) + x_i\beta + \varepsilon_i$ where y_i denotes for firm i the log ratio of the number of employees to sales. The variable z_i represents the size of firm i. The (row) vector x_i comprises the observations of firm i of the variables in the parametric part, and ε_i is an error term. The parametric part includes equity control rights variables and indicator variables for industry affiliation; equity control rights variables are lagged by one year. The regression coefficients of the variables of the parametric part are displayed in the table; to preserve space, plots of the effect of firm size on firm performance (as modeled in the nonparametric part) are not shown. Data are annual observations. Firm size is measured by (the log of) stock market capitalization, lagged by one year. *Equal representation*: Equal to 1 if there is equal representation on the supervisory board, 0 otherwise. *Insiders*: Fraction of equity control rights held by management, other employees, or families. *Banks*: Fraction of equity control rights held by domestic banks. *Government*: Fraction of equity control rights held by domestic government entities. *Largest shareholder*: Maximum fraction of equity control rights held by a single shareholder. *ISIC*: Industry affiliation based on International Standard Industrial Classification (United Nations, 1990) where category D (manufacturing) serves as the *numeraire* industry. Standard errors are corrected following White (1980); *t*-statistics significance levels (in two-tailed tests): * denotes 10% level, ** denotes 5% level, and *** denotes 1% level. The R^2 of this semi-parametric regression model is the ratio of regression sum of squares and the sum of regression sum of squares and error sum of squares. The effect of equal representation on the employees-to-sales ratio is calculated following Halvorsen and Palmquist (1980): $e^{\beta} - 1$ where β is the regression coefficient of the respective indicator variable. For the year 1989, for instance, we find that equal representation increased the employees-to-sales ratio by 42.8%.

	Dependent Variable: Employees-to-Sales Ratio									
	(1) 1989		(2) 1990		(3) 1991		(4) 1992		(5) 1993	
Year										
Explanatory Variable	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic
Equal representation	$3.563 \cdot 10^{-1}$	2.790***	$4.920 \cdot 10^{-1}$	2.896***	$4.261 \cdot 10^{-1}$	2.474**	$3.746 \cdot 10^{-1}$	2.607***	$2.667 \cdot 10^{-1}$	1.572
Insiders	$2.612 \cdot 10^{-1}$	1.273	$2.195 \cdot 10^{-1}$	0.765	$3.296 \cdot 10^{-1}$	1.448	$6.613 \cdot 10^{-2}$	0.354	$1.699 \cdot 10^{-1}$	0.651
Banks	$4.170 \cdot 10^{-1}$	1.289	$3.055 \cdot 10^{-1}$	0.709	1.893	2.152**	1.229	3.241****	1.205	2.812***
Government	$-1.351 \cdot 10^{-1}$	-0.546	$-3.218 \cdot 10^{-1}$	-1.233	$-7.248 \cdot 10^{-3}$	-0.023	$2.742 \cdot 10^{-2}$	0.117	$-1.375 \cdot 10^{-1}$	-0.509
Largest shareholder	$-1.463 \cdot 10^{-1}$	-0.657	$9.915 \cdot 10^{-2}$	0.359	$3.992 \cdot 10^{-1}$	0.817	$2.272 \cdot 10^{-1}$	0.759	$2.847 \cdot 10^{-1}$	0.870
ISIC A	$2.491 \cdot 10^{-1}$	1.194	$2.530 \cdot 10^{-1}$	0.989	$1.934 \cdot 10^{-1}$	1.012	$2.650 \cdot 10^{-1}$	2.261**	$4.936 \cdot 10^{-2}$	0.322
ISIC C	$7.021 \cdot 10^{-1}$	2.543**	$7.729 \cdot 10^{-1}$	2.677***	$5.547 \cdot 10^{-1}$	2.073**	$6.331 \cdot 10^{-1}$	2.914***	$8.321 \cdot 10^{-1}$	2.887***
ISIC E	$-5.196 \cdot 10^{-1}$	-3.191***	$-6.306 \cdot 10^{-1}$	-3.033***	$-2.098 \cdot 10^{-1}$	-0.861	$-4.391 \cdot 10^{-1}$	-2.568**	$-3.499 \cdot 10^{-1}$	-1.857*
ISIC F	$5.317 \cdot 10^{-1}$	4.254***	$2.041 \cdot 10^{-1}$	1.376	$4.769 \cdot 10^{-1}$	2.146**	$-1.991 \cdot 10^{-1}$	-0.854	$-8.136 \cdot 10^{-3}$	-0.033
ISIC G	$-2.023 \cdot 10^{-1}$	-1.064	$-2.436 \cdot 10^{-1}$	-1.352	$-4.638 \cdot 10^{-2}$	-0.215	$-4.759 \cdot 10^{-1}$	-2.736***	$-4.545 \cdot 10^{-1}$	-2.069**
ISIC H	1.078	4.929***	$9.848 \cdot 10^{-1}$	5.150***	$6.164 \cdot 10^{-1}$	2.398**	$8.770 \cdot 10^{-1}$	4.455***	1.244	6.415***
ISIC I	$-6.425 \cdot 10^{-2}$	-0.220	$-1.533 \cdot 10^{-1}$	-0.442	$6.885 \cdot 10^{-2}$	0.178	$-1.897 \cdot 10^{-1}$	-0.810	$-1.858 \cdot 10^{-1}$	-0.796
ISIC K	$-6.017 \cdot 10^{-1}$	-1.178	$-5.349 \cdot 10^{-1}$	-0.951	$3.290 \cdot 10^{-2}$	0.035	$1.128 \cdot 10^{-1}$	0.518	$7.891 \cdot 10^{-2}$	0.334
ISIC N	---	---	---	---	---	---	$8.261 \cdot 10^{-1}$	5.922***	$9.169 \cdot 10^{-1}$	4.392***
R^2	0.216		0.147		0.085		0.168		0.075	
Effect of equal rep.	0.428		0.636		0.531		0.454		0.306	
Number of observations	150		158		158		161		156	

Table 9

Wage bill-to-sales ratio and control rights allocation. The regression model is of the semi-parametric type $y_i = f(z_i) + x_i \beta + \varepsilon_i$ where y_i denotes the log of wage bill-to-sales ratio of firm i. The variable z_i represents the size of firm i, which (along with the intercept) is included in the nonparametric part. The (row) vector x_i comprises the observations of firm i of the variables in the parametric part, and ε_i is an error term. The parametric part includes equity control rights variables and indicator variables for industry affiliation; equity control rights variables are lagged by one year. The regression coefficients of the variables of the parametric part are displayed in the table; to preserve space, plots of the effect of firm size on firm performance (as modeled in the nonparametric part) are not shown. Data are annual observations. Firm size is measured by (the log of) stock market capitalization, lagged by one year. *Equal representation*: Equal to 1 if there is equal representation on the supervisory board, 0 otherwise. *Insiders*: Fraction of equity control rights held by management, other employees, or families. *Banks*: Fraction of equity control rights held by domestic banks. *Government*: Fraction of equity control rights held by domestic government entities. *Largest shareholder*: Maximum fraction of equity control rights held by a single shareholder. *ISIC*: Industry affiliation based on International Standard Industrial Classification (United Nations, 1990) where category D (manufacturing) serves as the *numeraire* industry. Standard errors are corrected following White (1980); *t*-statistics significance levels (in two-tailed tests): * denotes 10% level, ** denotes 5% level, and *** denotes 1% level. The R^2 of this semi-parametric regression model is the ratio of regression sum of squares and the sum of regression sum of squares and error sum of squares. The effect of equal representation on the wage bill-to-sales ratio is calculated following Halvorsen and Palmquist (1980): $e^{\beta} - 1$ where β is the regression coefficient of the respective indicator variable. For the year 1989, for instance, we find that equal representation increased the wage bill-to-sales ratio by 62.7%.

	Dependent Variable: Wage-to-Sales Ratio									
	(1) 1989		(2) 1990		(3) 1991		(4) 1992		(5) 1993	
Year										
Explanatory Variable	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic
Equal representation	$4.865 \cdot 10^{-1}$	3.695***	$5.031 \cdot 10^{-1}$	2.986***	$5.859 \cdot 10^{-1}$	3.778***	$4.810 \cdot 10^{-1}$	3.723***	$3.402 \cdot 10^{-1}$	2.105**
Insiders	$3.185 \cdot 10^{-1}$	1.436	$2.821 \cdot 10^{-2}$	0.098	$1.287 \cdot 10^{-1}$	0.557	$1.200 \cdot 10^{-1}$	0.668	$3.404 \cdot 10^{-1}$	1.249
Banks	$3.120 \cdot 10^{-1}$	0.861	$3.216 \cdot 10^{-1}$	0.520	2.170	2.278**	1.336	2.399**	1.614	2.418**
Government	$-3.423 \cdot 10^{-2}$	-0.151	$-4.127 \cdot 10^{-1}$	-1.502	$5.868 \cdot 10^{-2}$	0.208	$2.413 \cdot 10^{-1}$	1.188	$3.936 \cdot 10^{-2}$	0.169
Largest shareholder	$-2.491 \cdot 10^{-2}$	-0.107	$1.955 \cdot 10^{-1}$	0.661	$5.512 \cdot 10^{-1}$	1.289	$3.740 \cdot 10^{-1}$	1.410	$4.791 \cdot 10^{-1}$	1.694*
ISIC A	$3.569 \cdot 10^{-1}$	1.569	$3.126 \cdot 10^{-1}$	1.215	$2.749 \cdot 10^{-1}$	1.393	$2.644 \cdot 10^{-1}$	1.837*	$-7.594 \cdot 10^{-3}$	-0.041
ISIC C	$8.392 \cdot 10^{-1}$	3.628***	$8.343 \cdot 10^{-1}$	2.605***	$6.551 \cdot 10^{-1}$	2.656***	$6.523 \cdot 10^{-1}$	3.360***	$8.400 \cdot 10^{-1}$	3.116***
ISIC E	$-3.933 \cdot 10^{-1}$	-2.713***	$-5.833 \cdot 10^{-1}$	-3.016***	$2.455 \cdot 10^{-2}$	0.103	$-2.756 \cdot 10^{-1}$	-1.777*	$-1.775 \cdot 10^{-1}$	-1.049
ISIC F	$1.193 \cdot 10^{-1}$	1.122	$3.964 \cdot 10^{-2}$	0.288	$3.383 \cdot 10^{-1}$	1.488	$-7.245 \cdot 10^{-3}$	-0.043	$3.532 \cdot 10^{-2}$	0.240
ISIC G	$-6.062 \cdot 10^{-1}$	-2.913***	$-6.491 \cdot 10^{-1}$	-3.059***	$-4.757 \cdot 10^{-1}$	-1.919*	$-8.574 \cdot 10^{-1}$	-4.642***	$-7.755 \cdot 10^{-1}$	-3.271***
ISIC H	$7.724 \cdot 10^{-1}$	3.357***	$6.002 \cdot 10^{-1}$	2.479**	$1.616 \cdot 10^{-1}$	0.527	$4.758 \cdot 10^{-1}$	1.888*	$8.522 \cdot 10^{-1}$	3.952***
ISIC I	$-9.988 \cdot 10^{-3}$	-0.026	$-1.029 \cdot 10^{-2}$	-0.029	$2.215 \cdot 10^{-1}$	0.539	$-7.639 \cdot 10^{-2}$	-0.342	$-1.378 \cdot 10^{-1}$	-0.580
ISIC K	$-2.142 \cdot 10^{-1}$	-0.408	$-9.311 \cdot 10^{-2}$	-0.146	$6.471 \cdot 10^{-1}$	0.615	$-2.401 \cdot 10^{-1}$	-0.431	$3.656 \cdot 10^{-1}$	1.501
ISIC N	---	---	---	---	---	---	$7.139 \cdot 10^{-1}$	4.568***	$6.843 \cdot 10^{-1}$	2.949***
R^2	0.160		0.130		0.106		0.196		0.086	
Effect of equal rep.	0.627		0.654		0.797		0.618		0.405	
Number of observations	156		160		158		165		159	

Table 10

Leverage and control rights allocation. The regression model is of the semi-parametric type $y_i = f(z_i) + x_i \beta + \varepsilon_i$ where y_i denotes the degree of leverage of firm i. The variable z_i represents the size of firm i, which (along with the intercept) is included in the nonparametric part. The (row) vector x_i comprises the observations of firm i of the variables in the parametric part, and ε_i is an error term. The parametric part includes equity control rights variables and indicator variables for industry affiliation; equity control rights variables are lagged by one year. The regression coefficients of the variables of the parametric part are displayed in the table; to preserve space, plots of the effect of firm size on firm performance (as modeled in the nonparametric part) are not shown. Data are annual observations. Leverage is measured by (the log of) the debt-to-equity ratio; debt comprises all liabilities with stated maturity. Firm size is measured by stock market capitalization, lagged by one year. *Equal representation*: Equal to 1 if there is equal representation on the supervisory board, 0 otherwise. *Insiders*: Fraction of equity control rights held by management, other employees, or families. *Banks*: Fraction of equity control rights held by domestic banks. *Government*: Fraction of equity control rights held by domestic government entities. *Largest shareholder*: Maximum fraction of equity control rights held by a single shareholder. *ISIC*: Industry affiliation based on International Standard Industrial Classification (United Nations, 1990) where category D (manufacturing) serves as the *numeraire* industry. Standard errors are corrected following White (1980); *t*-statistics significance levels (in two-tailed tests): * denotes 10% level, ** denotes 5% level, and *** denotes 1% level. The R^2 of this semi-parametric regression model is the ratio of regression sum of squares and the sum of regression sum of squares and error sum of squares. The effect of equal representation on leverage is calculated following Halvorsen and Palmquist (1980): $e^\beta - 1$ where β is the regression coefficient of the respective indicator variable. For the year 1989, for instance, we find that equal representation increased the debt-to-equity ratio by 62.2%.

Dependent Variable: Debt-to-Equity Ratio

	(1) 1989		(2) 1990		(3) 1991		(4) 1992		(5) 1993	
Year										
Explanatory Variable	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic
Equal representation	$4.835 \cdot 10^{-1}$	3.004***	$5.570 \cdot 10^{-1}$	3.396***	$5.078 \cdot 10^{-1}$	2.900***	$2.149 \cdot 10^{-1}$	1.189	$2.849 \cdot 10^{-1}$	1.722*
Insiders	$-5.032 \cdot 10^{-1}$	-1.826*	$-1.175 \cdot 10^{-1}$	-0.429	$-1.371 \cdot 10^{-1}$	-0.501	$2.604 \cdot 10^{-1}$	0.907	$-1.883 \cdot 10^{-1}$	-0.784
Banks	$4.774 \cdot 10^{-1}$	1.225	$1.600 \cdot 10^{-1}$	0.397	$7.050 \cdot 10^{-1}$	1.321	$6.688 \cdot 10^{-1}$	1.681*	$5.596 \cdot 10^{-1}$	1.262
Government	$3.886 \cdot 10^{-1}$	0.872	$6.694 \cdot 10^{-1}$	1.551	$6.447 \cdot 10^{-1}$	1.209	$6.331 \cdot 10^{-1}$	1.080	$6.127 \cdot 10^{-1}$	0.998
Largest shareholder	$8.614 \cdot 10^{-1}$	4.049***	$5.675 \cdot 10^{-1}$	2.224**	$7.565 \cdot 10^{-1}$	3.049***	$5.749 \cdot 10^{-1}$	2.407**	$4.065 \cdot 10^{-1}$	1.692*
ISIC A	$5.102 \cdot 10^{-2}$	0.256	$-4.951 \cdot 10^{-2}$	-0.267	$-2.306 \cdot 10^{-1}$	-1.338	$-2.375 \cdot 10^{-1}$	-1.315	$2.658 \cdot 10^{-1}$	1.532
ISIC C	-1.547	-4.079***	-1.366	-3.062***	$-8.219 \cdot 10^{-1}$	-1.452	-1.039	-1.360	$-9.146 \cdot 10^{-1}$	-1.116
ISIC E	$8.189 \cdot 10^{-2}$	0.465	$-3.593 \cdot 10^{-3}$	-0.019	$-8.958 \cdot 10^{-2}$	-0.426	$-3.925 \cdot 10^{-1}$	-1.760*	$-4.405 \cdot 10^{-1}$	-1.966**
ISIC F	$8.277 \cdot 10^{-1}$	3.058***	$9.096 \cdot 10^{-1}$	2.631***	$9.509 \cdot 10^{-1}$	2.452**	$9.879 \cdot 10^{-1}$	3.231***	1.002	4.856****
ISIC G	$2.991 \cdot 10^{-1}$	1.348	$4.129 \cdot 10^{-1}$	1.798*	$5.308 \cdot 10^{-1}$	2.202**	$5.267 \cdot 10^{-1}$	2.112**	$6.142 \cdot 10^{-1}$	3.173***
ISIC H	$-4.803 \cdot 10^{-2}$	-0.262	$2.692 \cdot 10^{-1}$	1.445	$1.770 \cdot 10^{-1}$	0.672	2.060	8.968****	2.286	11.249***
ISIC I	$4.483 \cdot 10^{-1}$	1.819*	$1.518 \cdot 10^{-1}$	0.355	$4.638 \cdot 10^{-1}$	0.983	$5.336 \cdot 10^{-1}$	0.958	$5.521 \cdot 10^{-1}$	1.061
ISIC K	$3.096 \cdot 10^{-1}$	0.714	$-3.015 \cdot 10^{-1}$	-0.526	$1.365 \cdot 10^{-1}$	0.196	$-5.566 \cdot 10^{-1}$	-0.529	$-6.766 \cdot 10^{-1}$	-1.177
ISIC N	---	---	---	---	---	---	$-4.682 \cdot 10^{-1}$	-2.109**	$-7.944 \cdot 10^{-2}$	-0.391
R^2	0.271		0.220		0.216		0.237		0.295	
Effect of equal rep.	0.622		0.745		0.662		0.240		0.330	
Number of observations	173		177		180		186		186	

Table 11

Board compensation and codetermination. The regression model is of the semi-parametric type $y_i = f(z_i) + x_i\beta + \varepsilon_i$ where y_i denotes (the log of) the per-capita compensation of the (management or supervisory) board of firm i. The vector z_i represents size and performance of firm i; these two variables (along with the intercept) are included in the nonparametric part. The (row) vector x_i comprises the observations of firm i of the variables in the parametric part, and ε_i is an error term. The parametric part includes variables that interact equity control rights (lagged by one year) with firm performance; the parametric part also includes indicator variables for industry affiliation. The regression coefficients of the variables of the parametric part are displayed in the table; to preserve space, plots of individual and possible joint effects of firm size and firm performance on board compensation (as modeled in the nonparametric part) are not shown. Data are annual observations. Firm size is measured by stock market capitalization, lagged by one year. *Performance*: market-to-book ratio of equity, MTB. *Equal representation*: Equal to 1 if there is equal representation on the supervisory board, 0 otherwise. *Leverage*: Debt-to-equity ratio; debt comprises all liabilities with stated maturity. *Insiders*: Fraction of equity control rights held by management, other employees, or families. *Banks*: Fraction of equity control rights held by domestic banks. *Government*: Fraction of equity control rights held by domestic government entities. *Largest shareholder*: Maximum fraction of equity control rights held by a single shareholder. *ISIC*: Industry affiliation based on International Standard Industrial Classification (United Nations, 1990) where category D (manufacturing) serves as the *numeraire* industry. Standard errors are corrected following White (1980); *t*-statistics significance levels (in two-tailed tests): * denotes 10% level, ** denotes 5% level, and *** denotes 1% level. The R² of this semi-parametric regression model is the ratio of regression sum of squares and the sum of squares and error sum of squares. The regression coefficient of the interaction term *Performance × Equal representation* is an elasticity. For the year 1989, for instance, in Panel A (management board), this elasticity reads 0.1422. If firm performance increases by one percent (as measured by a one-percent increase in MTB), management board compensation of firms with equal representation increases by 14.22% above and beyond what management board compensation of firms subject to one-third representation increases.

Panel A: Management Board Compensation

	(1) 1989		(2) 1990		(3) 1991		(4) 1992		(5) 1993	
Year / Explanatory Variable	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Performance × Equal representation	$1.422 \cdot 10^{-1}$	2.883***	$1.800 \cdot 10^{-1}$	3.857***	$2.116 \cdot 10^{-1}$	3.058***	$2.007 \cdot 10^{-1}$	2.365**	$2.645 \cdot 10^{-1}$	3.688***
Performance × Insiders	$9.429 \cdot 10^{-2}$	1.201	$9.379 \cdot 10^{-2}$	0.992	$1.159 \cdot 10^{-1}$	1.101	$1.175 \cdot 10^{-1}$	1.069	$1.381 \cdot 10^{-1}$	1.443
Performance × Banks	$-1.271 \cdot 10^{-1}$	-0.719	$-2.690 \cdot 10^{-1}$	-1.479	$-2.461 \cdot 10^{-1}$	-1.219	$-5.184 \cdot 10^{-2}$	-0.168	$1.283 \cdot 10^{-1}$	0.434
Performance × Government	$1.558 \cdot 10^{-1}$	0.544	$-1.992 \cdot 10^{-1}$	-0.744	$6.812 \cdot 10^{-2}$	0.269	$1.977 \cdot 10^{-1}$	0.702	$-5.353 \cdot 10^{-1}$	-2.986***
Performance × Largest shareholder	$-4.387 \cdot 10^{-1}$	-3.976***	$-4.921 \cdot 10^{-1}$	-4.243***	$-3.196 \cdot 10^{-1}$	-2.160**	$-2.996 \cdot 10^{-1}$	-1.827*	$-3.880 \cdot 10^{-1}$	-2.553**
ISIC A	$-5.581 \cdot 10^{-1}$	-1.933*	$-2.166 \cdot 10^{-1}$	-1.121	$-6.109 \cdot 10^{-1}$	-2.361**	$-8.873 \cdot 10^{-1}$	-3.520***	$-4.307 \cdot 10^{-1}$	-2.109**
ISIC C	$5.495 \cdot 10^{-2}$	0.402	$-9.079 \cdot 10^{-2}$	-0.836	$1.700 \cdot 10^{-1}$	1.654*	$-4.611 \cdot 10^{-2}$	-0.503	$-1.728 \cdot 10^{-1}$	-1.314
ISIC E	$-8.827 \cdot 10^{-1}$	-5.634***	$-9.260 \cdot 10^{-1}$	-7.596***	$-7.154 \cdot 10^{-1}$	-5.950***	$-9.269 \cdot 10^{-1}$	-6.542***	$-5.058 \cdot 10^{-1}$	-3.894***
ISIC F	$3.411 \cdot 10^{-1}$	2.147**	$-2.847 \cdot 10^{-3}$	-0.022	$2.681 \cdot 10^{-1}$	1.709*	$1.150 \cdot 10^{-1}$	0.818	$1.726 \cdot 10^{-1}$	1.023
ISIC G	$2.642 \cdot 10^{-1}$	1.664*	$-2.327 \cdot 10^{-2}$	-0.186	$2.875 \cdot 10^{-1}$	2.286**	$1.272 \cdot 10^{-1}$	1.114	$1.842 \cdot 10^{-1}$	1.207
ISIC H	$-1.740 \cdot 10^{-1}$	-1.034	$-2.745 \cdot 10^{-1}$	-1.059	$-1.655 \cdot 10^{-1}$	-0.412	$-2.426 \cdot 10^{-1}$	-0.910	$-5.826 \cdot 10^{-1}$	-2.906***
ISIC I	$-2.437 \cdot 10^{-1}$	-0.941	$-4.365 \cdot 10^{-1}$	-1.811*	$-1.171 \cdot 10^{-2}$	-0.051	$-1.863 \cdot 10^{-1}$	-0.848	$-3.762 \cdot 10^{-1}$	-1.475
ISIC K	$-4.480 \cdot 10^{-2}$	-0.300	$3.434 \cdot 10^{-2}$	0.100	$5.388 \cdot 10^{-1}$	1.999**	$7.746 \cdot 10^{-2}$	0.241	$4.065 \cdot 10^{-2}$	0.103
ISIC N	---		---		---		$2.544 \cdot 10^{-1}$	3.335***	$5.027 \cdot 10^{-1}$	6.873***
R²	0.769		0.782		0.766		0.710		0.720	
Number of observations	168		171		172		176		171	

Table 11 (cont'd)

Panel B: Supervisory Board Compensation

Year	(1) 1989 Coefficient	t-Statistic	(2) 1990 Coefficient	t-Statistic	(3) 1991 Coefficient	t-Statistic	(4) 1992 Coefficient	t-Statistic	(5) 1993 Coefficient	t-Statistic
Explanatory Variable										
Performance × Equal representation	$1.315 \cdot 10^{-1}$	1.434	$2.677 \cdot 10^{-1}$	3.474***	$2.676 \cdot 10^{-1}$	2.973***	$1.024 \cdot 10^{-1}$	0.991	$7.269 \cdot 10^{-2}$	0.632
Performance × Insiders	$-1.878 \cdot 10^{-1}$	-1.374	$-3.710 \cdot 10^{-1}$	-2.744***	$-2.091 \cdot 10^{-1}$	-1.395	$-2.229 \cdot 10^{-1}$	-1.463	$9.554 \cdot 10^{-2}$	0.598
Performance × Banks	$-3.765 \cdot 10^{-1}$	-1.169	$-2.748 \cdot 10^{-1}$	-1.045	$-3.354 \cdot 10^{-1}$	-1.058	$-6.143 \cdot 10^{-1}$	-1.675*	$-4.458 \cdot 10^{-2}$	-0.181
Performance × Government	$-3.335 \cdot 10^{-1}$	-1.060	$-2.366 \cdot 10^{-1}$	-0.735	$-8.954 \cdot 10^{-2}$	-0.306	$-1.102 \cdot 10^{-1}$	-0.392	-1.045	-2.848***
Performance × Largest shareholder	$-9.807 \cdot 10^{-1}$	-5.496***	-1.026	-5.173***	-1.022	-4.537***	-1.078	-3.682***	$-9.109 \cdot 10^{-1}$	-3.846***
ISIC A	$2.883 \cdot 10^{-1}$	0.656	$-5.381 \cdot 10^{-2}$	-0.154	$-1.003 \cdot 10^{-1}$	-0.417	$-1.286 \cdot 10^{-1}$	-0.491	$4.990 \cdot 10^{-1}$	1.259
ISIC C	$-4.439 \cdot 10^{-1}$	-1.966**	$-2.809 \cdot 10^{-1}$	-1.726*	$-4.179 \cdot 10^{-1}$	-2.348**	$-2.914 \cdot 10^{-1}$	-1.682*	$-4.962 \cdot 10^{-1}$	-2.031**
ISIC E	$-7.833 \cdot 10^{-1}$	-3.183***	$-4.359 \cdot 10^{-1}$	-2.158**	$-5.774 \cdot 10^{-1}$	-2.999***	$-5.270 \cdot 10^{-1}$	-2.591***	$-1.735 \cdot 10^{-1}$	-0.714
ISIC F	$-3.071 \cdot 10^{-1}$	-1.189	$-5.022 \cdot 10^{-1}$	-2.747***	$-6.655 \cdot 10^{-1}$	-2.589***	$-4.001 \cdot 10^{-1}$	-1.657*	$-3.786 \cdot 10^{-2}$	-0.147
ISIC G	$-2.946 \cdot 10^{-1}$	-1.122	$-2.187 \cdot 10^{-1}$	-0.922	$-3.264 \cdot 10^{-1}$	-1.139	$-7.270 \cdot 10^{-4}$	-0.003	$-5.463 \cdot 10^{-3}$	-0.017
ISIC H	$-9.350 \cdot 10^{-1}$	-2.366**	$-2.586 \cdot 10^{-1}$	-0.615	$-6.900 \cdot 10^{-1}$	-1.471	$-5.289 \cdot 10^{-1}$	-1.270	$-9.775 \cdot 10^{-1}$	-2.320**
ISIC I	$-7.603 \cdot 10^{-1}$	-1.798*	-1.045	-2.050**	$-6.832 \cdot 10^{-1}$	-1.431	$-4.599 \cdot 10^{-1}$	-1.144	$-5.881 \cdot 10^{-1}$	-1.213
ISIC K	-1.457	-4.072***	-1.384	-4.556***	-1.008	-4.657***	-1.077	-3.520***	$-8.761 \cdot 10^{-1}$	-2.558***
ISIC N	---		---		---		$6.933 \cdot 10^{-2}$	0.838	$1.057 \cdot 10^{-1}$	0.521
R^2	0.576		0.593		0.558		0.582		0.572	
Number of observations	168		171		172		176		171	