The Impact of Different Stakeholders on Corporate Risk: The case of Germany

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Version August 2004

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This paper empirically investigates the impact of different stakeholder groups on the financial decisions of German firms. Because of the explicit role provided to different stakeholders in the decision-making process in Germany, Germany provides an ideal environment in which to investigate the relationship between the voice provided to various stakeholder groups and firms' financial decisions - we focus on those related to firm risk. After controlling for factors known to influence corporate decisions from previous research, we find evidence that the concentration and identity of both the largest and second largest shareholders as well as the size of the voice given to employees influence firm risk.

JEL Classification Numbers: G32, G34, L21
Keywords: corporate governance, capital structure, bankruptcy risk

* The financial support of the MBA Class of 1983 Faculty Fellowship is gratefully acknowledged. I would like to thank an anonymous referee, Michael Faulkender, Mark Huson and especially Mitchell Petersen for many helpful discussions and useful comments on earlier drafts. All remaining errors are my own.

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Abstract:

This paper empirically investigates the impact of different stakeholder groups on the financial decisions of German firms. Because of the explicit role provided to different stakeholders in the decision-making process in Germany, Germany provides an ideal environment in which to investigate the relationship between the voice provided to various stakeholder groups and firms' financial decisions - we focus on those related to firm risk. After controlling for factors known to influence corporate decisions from previous research, we find evidence that the concentration and identity of both the largest and second largest shareholders as well as the size of the voice given to employees influence firm risk.

1. Introduction:

The increasing number of corporate scandals in the United States and around the world in the late 1990s and early 2000s has resulted in a growing interest in how various stakeholders are able to influence the corporate decision-making process. Even though recent research has considered such corporate governance issues from various perspectives, the results remain inconclusive (for a nice survey see Gillan and Starks (2003)). We provide new insights into the role of different stakeholders in firms' financial decisions by empirically investigating the influence of several of the most important stakeholders on the risk profile of German firms. We focus on Germany because German corporate law, unlike that in the more commonly studied markets such as the U.K. and U.S., provides different stakeholder groups with explicit roles in the corporate decision-making process. This makes Germany an ideal environment within which to investigate how different stakeholders may affect some of the most important financial characteristics of firms.

In this study we consider how the voice of two important stakeholder groups – block shareholders and employees – influences firm financial risk as measured by their capital structure and risk of bankruptcy. The bank-oriented or "insider" system of corporate governance found in Germany and Japan provides a better perspective from which to investigate the role of these stakeholders than is possible in the market-oriented or "outsider" Anglo-American system. Perceptions of the value of the input from different stakeholders have gone back and forth over the past twenty years. During the 1980s Germany and Japan were held up as positive examples of the value of stakeholder participation. Throughout the 1990s, however, the competitive strength of the U.S. economy dampened these criticisms and countries started to mimic Anglo-American practices. Since the market corrections at the end of the 1990s and early 2000s (which have been, at least partially, blamed on corporate governance related concerns), questions have again been raised about the Anglo-American model and stakeholder activism is on the rise.

Our study therefore takes advantage of two of the most important features of the German corporate governance system (concentrated ownership and employee input into corporate decisions) on one of the frequently proposed virtues of this system – firms having a lower risk profile. As a consequence we contribute to the debate on the relationship between the presence of large block shareholders and firm value by studying the impact of a broad set of block shareholders on a different

aspect of firm value than has been considered in the past. We also extend this work by considering a relatively understudied stakeholder group: employees. Theory suggests that all of a firm's stakeholders have different incentives and different means of influencing the firm's decisions so we expect them to impact the firm's decisions differently (for a survey see Harris and Raviv (1991)). Many of these hypotheses are difficult to test using data from the U.K. and the U.S. where ownership is much less concentrated and the role of various stakeholders in corporate decisions is harder to determine. The most related studies have investigated the influence of large institutional shareholders or the influence of employees through Employee Stock Ownership Programs. These studies have found that the influence of these groups tends to be small unless their shareholdings and thus their voice in decisions are very large (e.g. Morck, Shleifer and Vishny (1988), Shleifer and Vishny (1997) and Gillan and Starks (2000)).

Although we are not the first to take advantage of the explicit roles provided to various stakeholders in German firms, we are the first (to our knowledge) to consider their impact on a firm's risk profile and one of the first to study such a broad set of stakeholders. Because of the important role of banks in Germany, many of the existing studies focus on the impact of bank shareholdings on corporate profitability or corporate value with mixed results (for example Cable (1985), Franks and Mayer (1998), Gorton and Schmid (2000a) and for a nice survey Edwards and Fischer (1994)). Taking advantage of the concentrated shareholdings in Germany, studies have also investigated the influence of different types of shareholders on corporate profitability with only slightly better results (e.g. Boehmer (2000), Edwards and Nibler (2000), Lehmann and Weigand (2000) and Edwards and Weichenrieder (2004)). In general the results suggest that the presence of a large shareholder (bank or not) is related to an increase in firm value. Since the German corporate governance system provides all stakeholders, not just shareholders, with a voice in the corporate decision making process, employees also have a strong voice. Once again research has been unable to document a clear relationship between employee representation on the board and firm profitability (e.g. Benelli, Loderer and Lys (1987) and Gerum and Wagner (1998)) but it does appear to lead to a decrease in firm value (e.g. Fitzroy and Kraft (1993), Schmid and Seger (1998) and Gorton and Schmid (2000b)).

Despite the relatively weak evidence that these different stakeholders influence firm profitability, we believe that they do influence firms' financial decisions. We believe that the size of different stakeholders' voice as well as their individual objective functions will influence the firm's risk profile.

For example, firms owned by a family and firms with more employee representation on the corporate board should make less risky financial decisions. This follows because we assume large private shareholders and employees are poorly diversified and thus more risk-averse regarding the future health of the firm (for a nice discussion see Byrd et al. (1998), and Dinh (1999)). As the number of significant stakeholders increases and their identity changes, however, we expect the objectives of the stakeholder group to change and thus firm decisions may change (for motivating discussions see Cubbin and Leech (1983), Crama, Leruth, Renneboog and Urbain (2002), Becht and Boehmer (2003) and Edwards and Weichenrieder (2004)). For example, the risk profile of a firm owned by a bank is likely to differ from that of a privately-owned firm. The profile may also differ when there are multiple large shareholders because the firm's actions must satisfy the possibly divergent objectives of all of the shareholders[1].

Our sample consists of all of the publicly listed German non-financial firms available from Datastream between 1988 and 2000[2]. This is an interesting period because it covers the periods both before and after the German financial market reforms[3] in the early 1990s and covers a wide range of economic conditions. To investigate the effect of changes in stakeholders' influence on firms' risk profiles, we use a regression analysis. We measure capital structure using the ratio of debt to total assets and the risk of bankruptcy using Altman's (1968) Z-score. To allow for possible differences resulting from the reforms in the early 1990s and changes in the economic conditions in Germany during this period, we consider i) the whole period, ii) the period up to and including 1993 and iii) the period after.

After controlling for factors found to influence corporate decisions in earlier research, we find that the relative importance of different stakeholders can help to explain firms' leverage and risk of bankruptcy. The impact of employee representation on a firm's capital structure is weak using linear tests, but becomes significant after allowing for non-linearities. Specifically we find that increasing employee representation is related to lower leverage but this only becomes clear after modeling the non-

[1] These ideas are fully developed and motivated in the next section.

[2] We exclude financial firms because of the unique rules under which German Universal banks operate. As a result of these rules, the corporate governance structure of banks is not directly comparable to that of other firms (Benston (1994) and Edwards and Fischer (1994) provide nice discussions).

[3] In December 1986 the German Stock Exchange Admission Act was modified to make it easier for firms to become listed on German exchanges. The impact was an increase in liquidity and an increase in the number of listed firms by over twenty percent by 1992. Further the "Securities Prospectus Act: Act on Simplifying the Issue of Bonds" was passed in December 1990 and took effect in 1992. It facilitated the issuing of all forms of commercial paper.

linear relationship between leverage and firm size. We find that the leverage of German firms initially falls as firm size increases, but leverage starts to increase for very large firms. This helps explain the puzzling result from earlier studies that found the capital structure of firms in Germany, unlike in other countries, has leverage decreasing as firm size increases. Looking at the Z-scores, we find that a firm's level of risk actually increases with more employee representation. Both results suggest an interesting role for employees in firms' financial decisions.

We also find that the type of owner and the size of their holdings help explain our measures of firm risk. The objectives of different types of owners are not the same and we see this reflected in their choice of capital structure and risk of bankruptcy. Private and foreign-owned firms, for example, make more risk-averse decisions than widely-owned firms. Potential explanations are that the private owners are less diversified and foreign-owned firms are required for the owner's access to the German market so the management of both types of firms is focused on ensuring the long-term health of the firm. Although the largest shareholder has a significant impact on firm decisions, this decreases as they have to share control with another large shareholder. For example, when a bank is the largest shareholder as the size of the bank's holdings increases the leverage decreases, but as the holdings of the second largest shareholder increase the leverage increases. This suggests that even though the bank's incentives may differ from those of other types of owners, the bank's ability to influence decisions changes as the power of the second shareholder increases. In general as the control of the second largest shareholder increases, the influence of the largest shareholder falls and the firm's objectives appear to converge toward profit maximization, regardless of the type of owner. Consequently the German corporate governance environment provides some interesting new insights into the role of different stakeholders in firms' financial decisions.

The paper develops as follows. In the next section we present some background on the corporate governance environment in Germany and develop our hypotheses. Section three discusses our data and presents some descriptive statistics. Our empirical techniques and results are presented in section four. We conclude and discuss areas for future research in the final section.

2. Impact of Different Stakeholders on Firm Risk

Although German firms strive to generate profits for their shareholders, this is not their sole objective. In fact, Article 14(2) of the German constitution states: "Property imposes duties. Its use

should serve the public well-being." Consequently management must consider the impact of its decisions on all of a firm's stakeholders, not just its shareholders. Consistent with this view, German corporate governance provides all of a firm's stakeholders with an explicit role in the decision-making process. Two of the major consequences of this are concentrated ownership and employees having a significant voice in corporate decision-making (codetermination). We take advantage of these characteristics to study how different stakeholders are able to influence firm risk.

The high concentration of ownership in German firms has been well-documented in previous studies (e.g. Franks and Mayer (2001), Faccio and Lang (2002) and Becht and Boehmer (2003)). These studies find that about 85% of the largest non-financial firms have a single shareholder with a block in excess of 25% of the voting shares and over 55% of these firms have a shareholder owning more than 50%. Although banks frequently hold only a small number of these blocks, banks have been the subject of extensive study because they frequently have a disproportionate voice in corporate decisions. This is because shares in Germany are in bearer form and banks are the custodians of shares left with them by individual investors, so the banks may have voting power significantly beyond that provided by their own shareholdings alone.

Despite the powerful role of banks, the influence of other stakeholders is guaranteed by the German two-tiered board system (the supervisory and management boards). The management board is responsible for the day-to-day operations and consists of managers and other corporate insiders. The supervisory board oversees the management board and its members are representatives of the firm's major stakeholder groups: shareholders, banks and employees. An important feature of the supervisory board is that it must have increasing employee representation as firm size increases: one third employee representation when the firm has more than 500 employees and one half when it has more than 2,000 employees (for a discussion see Benelli, Lodere and Lys (1987), or Hopt (1998)). Consistent with this, studies of the composition of the supervisory boards for the 100 largest German companies over the period from 1986 to 1993 find that about 50% of the supervisory board is made up of individuals closely aligned with labor (employees or union executives), a further 5% are politicians or civil servants whose interests may also be closely aligned with employees, and the rest are shareholder and/or bank representatives (Bundesverband Deutscher Banken (1986 to 1993)).

Since one of the goals of the German governance system is to promote firm stability, we investigate the relationship between measures of firm risk and measures related to the voice provided to

each of these stakeholder groups. Below we discuss and motivate our measures and how we expect them to relate to one another.

Firm Risk:

More highly levered non-financial firms are believed to be closer to financial distress and therefore riskier (for a discussion see, for example, Myers (1984)), so we use capital structure as our first measure of firm risk. We measure capital structure using the proportion of debt to total assets because there are concerns with applying many of the other commonly used measures to German firms. For example, measures requiring the market value of equity are problematic since relatively few German firms have publicly traded equity and the German stock market has a reputation for being illiquid and thus having inefficient prices. Although this is gradually changing, it is not clear what impact this could have on our results. Some of the other commonly used measures require items such as the book value of equity and earnings, but German accounting standards promote the smoothing of earnings so these values may be misstated. This leaves the Debt / Total Assets ratio as the most reliable measure of a firm's leverage.

The second measure of risk we use is the Z-score (Altman (1968)). The Z-score has been found to have a very high and consistent probability of accurately predicting bankruptcy for firms across various countries[4]. The Z-Score is constructed using the weighted sum of five financial ratios:

$$Z = 1.2\times(\text{Working Capital / Total Assets}) + 1.4\times(\text{Retained Earnings / Total Assets}) +$$
$$3.3\times(\text{EBIT / Total Assets}) + 0.6\times(\text{Market Value of Equity / Total Liabilities}) +$$
$$1.0\times(\text{Sales / Total Assets})$$

When interpreting the Z-score, a lower value indicates that the firm is at a higher risk of bankruptcy. For general industrial firms a Z-score above 2.6 generally indicates that the firm is safe, between 1.1 and 2.6 is a grey area, and below 1.1 suggests the firm is very risky (Altman (1993)).

[4] As a consistency check we also consider a predictive measure for the risk of bankruptcy developed specifically for German firms (Bundesbank (1992)): the capital recovery ratio ((Net Income/Expenditures) / Total Capital). Because the results are similar to those obtained using the Z-score they are not presented.

Identity and Concentration of Shareholdings

Even though Shleifer and Vishny (1986), among others, claim that concentrated ownership may promote active governance and thus improve corporate performance, studies such as La Porta, Lopez-de-Silanes and Shleifer (1999) argue that systems like that in Germany may allow large shareholders to extract private benefits at the expense of firm performance. Investigating these ideas, studies such as Boehmer (2000) and Franks and Mayer (2001) find evidence consistent with large blockholders in Germany taking advantage of private benefits of control at the expense of the remaining shareholders. Extending these studies, researchers have found that the presence of two or more major shareholders may overcome some of these problems (e.g. Cubbin and Leech (1983), Crama, Leruth, Renneboog and Urbain (2000) and Edwards and Weichenrieder (2004)). These studies suggest that a single major shareholder may use their influence to maximize their utility which may not mean maximizing firm profits. However when there are other large shareholders, coordinating all of their objectives is more difficult. Because of the different costs and benefits of the different firm-level utility functions, a utility function which is frequently acceptable to all large shareholders is profit-maximization (Crama et al. (2000))[5].

The trade-offs required to coordinate the objectives of major shareholders depend on their relative sizes. For example, a shareholder with 50% or more of the existing equity can control many of the decisions but 75% is required for the most important decisions. Consequently the voting power or ownership concentration of different shareholders may play a significant role in determining the firm's objective function. This suggests possible non-linearities in the relationship between the control of different shareholders and firm risk. These non-linearities may depend on certain thresholds or they may be U-shaped as found for the relationship between ownership and profitability in Morck, Shleifer and Vishny (1988). Beyond the degree of control of different shareholders, studies such as Cubbin and Leech (1983), McConnell and Servaes (1990), Thomsen and Pedersen (2000) and Heiss and Koeke (2004) suggest an important role for the identity of the major shareholders. Different types of shareholders may have different utility functions and objectives which may influence firm decisions in different ways. As a result we consider both the concentration of ownership (a measure of their ability to influence managers) and their identity (an indication of their objectives).

[5] Edwards and Weichenrieder (2004) provide a detailed discussion of these trade-offs and the implications for how financial decisions are made within the firm.

We classify the ownership of firms as being widely-held or owned by private individuals/families, non-financial corporations, foreign firms, financial corporations/banks or the government. To understand why these owners may influence firms in different ways, we consider their potential objectives. Managers of widely-held or diversely-held firms, for example, must satisfy the objectives of a broad set of shareholders so they are the most likely to behave in a profit-maximizing fashion. Consequently these firms should have relatively optimal leverage and an average risk of bankruptcy (Note: we use diversely-held firms as our benchmark). For privately owned firms, on the other hand, the management's objectives are likely to be to ensure the long term survival of the company rather than maximizing short-term profitability. These owners usually are not well-diversified so they are concerned with losing the value of their investment and private benefits of control. Consequently we hypothesize that privately held firms will have low risk profiles - low leverage and high Z-scores.

If a non-financial corporation is the largest shareholder, we would expect the firm to behave in a relatively risk-neutral fashion. Corporate owners have a more diversified portfolio so the managers of these firms are likely to be evaluated on the profitability of the company. Consequently these firms will try to optimize their financial choices in a manner similar to widely-held firms. A point to consider is that corporately-owned firms may be subsidiaries or affiliates of the owner, so the firm's decisions may be optimal for the group but not necessarily for the firm itself. This most likely occurs when there is highly concentrated ownership. Consequently we expect to see corporately-owned firms having similar capital structures and risks of bankruptcy to widely-held firms, except at the highest concentration levels.

Since most foreign-owned firms are probably used to provide the parent with access to the German market, these firms may have different objectives than comparable, domestically-owned firms. For example, the parent may prefer to use debt when raising capital rather than dilute their control by issuing new equity. This may increase the leverage of these firms, especially at the highest ownership concentration levels. However, due to the importance of the local firm to the foreign owner, the risk profile of these firms may be better than for comparable, domestically owned firms.

We expect firms owned by banks to have more debt in their capital structure because of both their improved access to debt financing and the bank's ability to profit from these loans. Since banks benefit from increases in the value of the firm as well as from the interest income from loans, it has been proposed that the bank's objectives may change with their level of ownership. At low levels of ownership, banks are more concerned with their income from loans than firm profitability, but as the

bank's ownership stake increases they become more concerned with firm profitability and thus the firms may use relatively less debt. As a result we expect to see bank owned firms using more debt, except at high ownership levels. Since banks may own firms that were in financial distress and banks are knowledgeable owners, it is less clear how risky they will be.

Government ownership means that the firm may exist to accomplish social or political objectives, thus profit maximization may not be the objective of these firms. Even though these firms should be able to take the maximum advantage of debt, they may not for political reasons. Consequently we expect these firms to have relatively less debt in their capital structure. Because the implicit guarantees resulting from government ownership would allow these firms to support financial structures that are too risky for other firms, we expect them to have a higher apparent risk of bankruptcy. Both of these effects on firm risk would be relatively insensitive to the percentage ownership.

Codetermination:

Codetermination allows German workers to participate in management decisions. The results from studies of the impact of codetermination on German firms are unclear. Although Benelli, Loderer and Lys (1987) and Gerum and Wagner (1998) are unable to find evidence that codetermination has any impact on firm profitability, studies such as Fitzroy and Kraft (1993), Schmid and Seger (1998) and Gorton and Schmid (2000b) find that increased employee representation has a negative impact on firm value. International studies considering the impact of Employee Stock Ownership Programs (ESOPs) find that the larger the employee's percentage ownership, the more successful the firm is in terms of productivity and the ability to recruit and retain employees but not necessarily in terms of profitability. In our study we expect to see increasing employee presence on the supervisory board being related to decreasing firm risk and therefore minimizing the risk of employees losing their jobs. Specifically we expect to see the lowest leverage, and the lowest risk of bankruptcy (e.g. highest Z-scores) for firms with over 2,000 employees and thus 50% representation on the supervisory board.

Control Factors:

To control for some of the factors that have been found to influence corporate financial decisions in previous research, we include the following factors in our analysis: the firm's size, the volatility of the

firm's earnings, the Herfindahl index for the firm's industry, the amount spent annually on capital expenditures as a percentage of total assets, the amount spent on Research and Development as a percentage of sales and a dummy variable for the firm's industry.

Firm size is measured as the log of firm sales. This is included because the size of the firm is generally accepted as an inverse proxy for the probability of bankruptcy in both domestic and international studies (e.g. Rajan and Zingales (1995)). Conventional wisdom suggests that as the firm size increases, the firm should be better diversified and thus be able to better handle adversity. This should result in larger firms having a more levered capital structure and a lower risk of financial distress (higher Z-scores). Because Rajan and Zingales (1995), among others, have documented that in Germany leverage actually decreases as firm size increases, we investigate the possibility that our governance-related explanatory factors will provide insight into this unusual relationship.

The level of volatility in earnings is also believed to influence a firm's financial decisions (e.g. Myers (1984)). Firms with highly volatile earnings are inherently risky, so these firms should borrow less and have lower Z-scores. Amplifying this is the fact that German accounting standards are designed to minimize earnings volatility, so that any volatility may represent an exceptionally large change in the condition of the company and thus be more clearly related to changes in the firms' financial policies or risk profile.

The Herfindahl index is used to control for the level of competition in the firm's industry. The Herfindahl index is obtained by summing the squares of market-share (based on the percentage of sales) of all of the firms in the same industry. Formally, for firm i at time t: $Herf_{i,t} = \sum_{j=1}^{N} marketshare_{j,t}^2$ for all firms j contained in the same one digit SIC industry code as firm i. The Herfindahl index helps differentiate between a competitive industry in which players have equal shares and another where one player has a much larger share than the others. The former, more competitive industry would have a lower Herfindahl index[6]. Theory is divided regarding the influence of increased competition on financial decisions. Some studies suggest that firms in competitive industries increase their leverage to decrease the "toughness" of competition (e.g. Fudenberg and Tirole (1986), and Chevalier (1995)), whereas others

[6] For example when there are two firms evenly sharing the market, the Herfindahl index would be $(0.50)^2 + (0.50)^2 = 0.50$. If, however, one firm has 80% of the market and the other 20% , the Herfindahl index would be $(0.80)^2 + (0.20)^2 = 0.68$.

suggest that increased competition may lead to a decrease in leverage to ensure firm survival (e.g. Brander and Lewis (1986) and Maksimovic and Zechner (1991)). We believe that increased competition (a lower Herfindahl index) should lead to decreased leverage and thus an increased chance of survival (higher Z-score).

Due to the well-documented differences across industries, we include dummy variables for different industries. To limit the overlap with the Herfindahl index we only use four industry dummy variables: SIC1 is for primary industries such as mining, agriculture, construction and basic manufacturing, SIC2 corresponds to the production of chemicals and the manufacturing of machinery and other durable goods, SIC3 represents services and leisure and SIC4 covers utilities and financial services.

Technology and human capital may influence the riskiness of a firm (for discussions see Harris and Raviv (1991) and Opler and Titman (1994)). As a result we incorporate capital expenditure as a percentage of assets, and R&D as a percentage of sales in our model. As the importance of intellectual property and other types of intangible assets increases, we expect the leverage to decrease and the risk of the firms (i.e. the probability of bankruptcy) to increase.

3. Data:

We use accounting data for all of the German non-financial firms covered by Datastream over the period from 1988 to 2000. We supplement this data with information on the identity of the major shareholders and their percentage ownership for each firm taken from various editions of Commerzbank's Wer Gehoert zu Wem (Commerzbank (1991, 1994, 1997 and 2000)). These books provide a comprehensive list of the shareholders and the size of their holdings for all German companies. Based on these lists we classify the largest shareholder for each firm as follows: widely held firms with diverse shareholders (Div), family or privately-owned firms (Private), firms owned by a non-financial corporation (Company), firms owned by a financial corporation (Bank), foreign-owned firms (Foreign), and government-owned firms (Gov). Measuring the percentage holdings of each shareholder is difficult in Germany because of the frequent use of ownership pyramids (for a discussion see Faccio and Lang (2002) or Becht and Boehmer (2003)). To more accurately measure the true influence of each shareholder, we trace through the pyramid structures to determine the ultimate voting control of each shareholder in each company.

In Table 1 we characterize the ownership structure of our sample of 512 non-financial firms. As we can see in Panel A, the majority of our German companies are either controlled by other German non-financial companies (38%) or private individuals (38%). Very few firms are widely held (less than 4%) or directly owned by financial institutions (about 4%). This is consistent with the results from previous studies of the ownership of German firms. Panel B demonstrates the high concentration of ownership – about 62% of our firms have a single shareholder with more than 50% of the equity. Firms owned by corporations have the most concentrated ownership – the largest shareholder owns an average of 66% of the equity. Bank ownership, on the other hand, is the least concentrated with an average holding of just under 46% (Note: this probably understates the financial institutions true influence because they have voting rights from many of the other shareholders). The second largest shareholders tend to have much smaller holdings. In general the second largest shareholders own 17% of the equity and about 28% of these owners hold stakes of at least 25% of the firm's equity. We focus on the 25% threshold because an owner with 25% of the equity can block major decisions such as changes in a firm's statutes, changes in equity capital, mergers or liquidations which typically require a 75% majority.

One of the issues that arises in the use of German company account data is that German accounting standards are more conservative than their U.K. and U.S. counterparts. Nobes and Parker (1991), for example, suggest that German accounting focuses more on conservatism than does U.S. accounting: "German firms put earnings aside in good times to help weather the bad times". As a result, we use the modifications suggested in Rajan and Zingales (1995) to more accurately classify certain accounting items as assets or liabilities. Since German firms do not net out their pension assets and liabilities, Rajan and Zingales (1995) assume that pensions are fully funded and thus subtract pension liabilities from assets. They also add deferred taxes to the book value of equity and subtract the value of intangibles from assets. We supplement these modifications because pension liabilities are not expensed or paid into a trust thereby providing German firms with an additional source of internal funding. As a consequence we investigate the robustness of our results to allowing reserves for pensions and "other" or "special" reserves to be used as potential sources of financing and thus reclassifying them as liabilities[7].

[7] The corresponding results are qualitatively similar to those using just the Rajan and Zingales (1995) adjustments, so we only present the results following Rajan and Zingales (1995).

For our sample, Figure 1 demonstrates how the average capital structure of our firms changes over time. Our overall average Debt to Total assets of 26% is similar to the value of 20% in Rajan and Zingales (1995). Thus our data continues to demonstrate that German firms have lower leverage than Japanese firms (53%), U.S. firms (37%) and U.K. firms (28%)[8]. Looking at the average leverage in each year, we see it is fairly stable over the early part of our sample, but starts to increase after 1993. There are two likely explanations. First, the economy in Germany started a downward trend in 1992-1993 – following the re-unification boom, Germany went into a recession in 1992 and had two near-misses in 1996 and 1999. The other explanation is that German firms took advantage of the regulatory changes that took effect in 1992 allowing German firms to more easily raise debt. These suggest a possible structural break around 1993 so we split the sample at the end of 1993.

Comparing the leverage across the types of owner, we find several minor differences. Foreign firms have the highest leverage over our sample period (about 29%) followed by bank-owned firms (28%), non-financial corporately owned firms (27%), widely-held firms (26%), and private firms (24%). Government owned firms have, by far, the lowest leverage (12%). Although, with the exception of government-owned firms, the differences in leverage across owners are not statistically significant and these numbers do not correct for other factors which may influence leverage, they do suggest that the identity of the owner may influence the firm's capital structure decision and thus its level of risk.

To investigate the impact of the number of employees on leverage, Figure 2 shows the average leverage of firms of different sizes over our sample period. We can see that small firms (firms with less than 1,500 employees) have relatively low leverage. This is consistent with the evidence in the U.S. that small firms are capital constrained (Petersen and Rajan (1994)). It is interesting to note how the average leverage changes with firm size: the leverage decreases markedly as the firm passes 500 employees, it increases gradually as the number of employees rises from 500 to 2,000 employees, peaks for firms with around 2,000 employees, and decreases gradually for the larger firms. Interestingly, if one extends the figure out, the average leverage starts to increase again at around 15,000 employees. Even though many of the differences in leverage across firms with different numbers of employees are not statistically significant, they do suggest that the presence of employee representatives on the supervisory board may influence financial decisions.

[8] These values are taken from Rajan and Zingales (1995).

For our other dependent variable, the Z-score, Figure 3 illustrates how the overall risk of bankruptcy has increased throughout our sample period (Note: the risk of bankruptcy increases as the Z-score decreases). In the early part of the sample the economy in Germany was doing very well and this is reflected in the high Z-scores. As the German economy started slowing down through the 1990s, the average Z-score can be seen to deteriorate. The timing of the decline in the Z-score corresponds to the increase in leverage in Figure 1, so both may be related to the same effects. Therefore we divide our sample into two sub-samples for both of our dependent variables.

There are several interesting differences in the levels of bankruptcy risk across the types of owners. We find that firms owned by the government have much lower Z-scores (0.76 on average), with firms owned by the other types of owners having Z-scores in the range of 1.81 (bank-owned firms) up to 2.02 (both privately-owned and widely-held firms). With the exception of the government-owned firms, the differences across ownership types are not statistically significant. The differences suggest that the type of owner has an impact on the risk profile of the firms.

In Table 2 we present some summary statistics for our control variables over our entire sample. We see that the size of our firms varies rather substantially ranging from a low of a few thousand Deutsche Marks to hundreds of billions of Deutsche Marks but with an average of roughly DM 150 million. We also find a correspondingly wide range in the volatility of operating profits. Although the average industry concentration (Herfindahl index) is 0.16 suggesting a moderate degree of competition, the level of competition across industries varies substantially going from a low of 0.05 to a high of almost one. Finally our measures for the value of intangible assets (R&D_Sales and CapExAssts) suggest that some firms spend a considerable amount on Research and Capital Expenditures but the average is relatively modest. Capital expenditures are relatively low compared to the value of assets, about 7%, but the average amount spent on Research and Development is higher at about 28%. In results not presented, we look at the averages for these variables in each year of our sample. We can see the impact of the changing economic environment on some variables. For example, sales increase gradually over our sample, but the spending on Research and Development and (to a lesser degree) the spending on Capital Expenditures decrease after 1993. The other values remain relatively stable over our sample.

Since all of our factors are not necessarily exogenous, we measure their correlations. We find that the annual correlation between our dependent variables (debt/total assets and the Z-scores) is only 19%. Although this is statistically different from zero, it is still low enough to suggest that these

measures maybe capturing different aspects of firm risk[9]. In Table 3 we present the correlations between our independent variables over the entire sample period. These indicate a significant correlation between ln(sales) and both the volatility of operating profits and the number of employees. For the number of employees, we use dummy variables for firms with between 500 and 2,000 employees (Demp_med), between 2,000 and 2,500 employees (Demp_l), and more than 2,500 employees (Demp_xl). We include a dummy for firms with between 2,000 and 2,500 employees because these firms had years with less than 2,000 employees so they may not have fifty percent employee representation on their board. Overall these relationships suggest that multi-colinearity between these variables may impact our results, so we perform tests including and excluding the different variables. We also consider potential non-linearities in the relationships to ensure the robustness of our results.

4. Empirical Analysis:

To formally investigate the impact of the German corporate governance environment on German firms' financial decisions we start by estimating a linear model relating our control factors ($c_{i,t}$) and our measures of the influence of firms' different stakeholders ($f_{i,t}$) to the capital structure and risk of bankruptcy ($y_{i,t}$) for firm i at time t:

$$y_{i,t} = \alpha + \gamma \cdot c_{i,t} + \beta \cdot f_{i,t} + \varepsilon_{i,t} \qquad (1)$$

Since it is possible that the changing economic and regulatory conditions over our sample period could impact our results, we estimate the model over the full period (1988-2000) and over two sub-periods (from 1988 to 1993 and 1994 to 2000).

We estimate this as a mixed model containing both fixed and random effects allowing for heteroskedasticity and first-order serial correlation in the residuals. The model includes firm- and time-specific effects to control for the systematic variation in firm risk that may not be captured by our explanatory factors. We model the firm-specific effects as a random effect and the time-specific effects as a fixed effect. Modeling firm-level effects as random effects is more appropriate than modeling them as fixed effects, because our data is a sub-sample of all German firms and our set of control and governance factors contain several measures which are relatively time invariant. We model time as a fixed effect to capture the possible differences across years that impact all firms. For example,

[9] The values for the correlation are for the entire sample period, but the results are similar on an annual basis.

macroeconomic factors, or regulatory changes influence all firms and they may differ from year to year. In all cases the final choice between fixed and random effects was confirmed using a likelihood ratio test[10].

The final model we estimate is therefore:

$$y_{i,t} = \alpha + \gamma c_{i,t} + \beta_1 D_{medium,t} + \beta_2 D_{large,t} + \beta_3 D_{very\ large,t} + (\beta_4(Priv_t \times 1^{st}) + \beta_5(Priv_t \times 2^{nd})) +$$
$$(\beta_6(Comp_t \times 1^{st}) + \beta_7(Comp_t \times 2^{nd})) + (\beta_8(Bank_t \times 1^{st}) + \beta_9(Bank_t \times 2^{nd})) +$$
$$(\beta_{10}(Forn_t \times 1^{st}) + \beta_{11}(Forn_t \times 2^{nd})) + (\beta_{12}(Gov_t \times 1^{st}) + \beta_{13}(Gov_t \times 2^{nd})) + \lambda D_{years} + \varepsilon_{i,t}$$

and the residual is decomposed as:

$$\varepsilon_{i,t} = \mu_i + v_{i,t} \qquad (2)$$

where $y_{i,t}$ represents the leverage or Z-score for firm i at time t, $c_{i,t}$ is the set of control factors, D_{size} represent dummies for the employee representation on the board, Priv, Comp, Bank, Forn, and Gov represent the identity of the principal owner, 1^{st} represents the percentage ownership of the largest shareholder, 2^{nd} the percentage ownership of the second largest shareholder, and $\varepsilon_{i,t}$ is the residual. Since the model is estimated where the years are treated as fixed effects we include a series of dummy variables for each year, D_{years}, in the model. To model the firm-specific effects as a random effect the residual is decomposed into a firm-level effect (μ_i) and a purely random or white noise component ($v_{i,t}$).

Since it is possible that our set of explanatory factors do not influence our dependent variables in a linear fashion, we also investigate several non-linear specifications as well.

Empirical Results: Control Variables

We expect the leverage to increase and the risk of bankruptcy to decrease as: i) the size of the firm (ln(sales)) increases, ii) the historical volatility of profits (VolOpPi) decreases, iii) the Herfindahl index (Herf) decreases, iv) the spending on R&D scaled by sales (R&D_Sales) decreases and v) capital expenditures relative to the value of assets (CapExAssts) decreases. In the first columns of Table 4a we have the results for leverage over the entire period (1988-2000). The results largely support our hypotheses.

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[10] For a detailed discussion of the methodology see Judge et al. (1985).

We find that, contrary to conventional wisdom but consistent with the findings of Rajan and Zingales (1995) and others, leverage decreases as firm size increases (the t-statistic is -2.4[11]). We also find that leverage decreases as the Herfindahl index increases (-1.9) and as the specificity of the assets increases (as measured by increased capital expenditures (-13.7)). Somewhat surprisingly, we did not find a significant relationship between leverage and the volatility of the operating profits (-1.1). One possible explanation for this finding is that German accounting encourages the smoothing of earnings so the changes in the operating profits may contain little information. The relationship we find between the Herfindahl index and leverage provides interesting new insights into the role of industry concentration in firms' financial decisions. As the concentration in an industry decreases and thus the competition in the industry increases, the leverage increases. This is consistent with the theories suggesting that firms increase their leverage to decrease the "toughness" of competition.

The results across sub-periods are less significant than for the whole period but they are generally consistent in direction. The only exception is that we find leverage increases as size increases from 1988 to 1993. Otherwise the impact of our control factors is relatively stable over time and is broadly consistent with those from previous empirical and theoretical studies.

Moving to the impact of our controls on the Z-score in Table 4b we continue to find results that are consistent with our hypotheses. We find that the risk of bankruptcy decreases as: the size of the firm increases (13.1), the volatility of profits decreases (-1.9) and as the research and development costs and capital expenditures decrease (-3.2 and -7.4 respectively). Although not statistically significant, the relationship with the Herfindahl index is interesting – as the concentration in an industry decreases (i.e. the competition increases), the risk of bankruptcy decreases. A possible explanation is that the managers of firms in competitive industries make decisions to ensure their long-term survival which is reflected in higher Z-scores. For the other variables, we interpret the results as follows: the risk of bankruptcy decreases as size increases (larger firms have more resources to avoid bankruptcy), as volatility of operating profits decreases (firms with less volatile earnings have more reliable earnings and thus are better able to avoid bankruptcy) and as the size of firm specific assets decreases (these firms are more flexible in the use of their assets so they are better able to avoid the problems associated with downturns).

[11] Note: throughout our discussion of the results the relevant t-statistics will be presented in parenthesis following a statement referring to statistical significance.

Across sub-periods we find more stability and consistency in the results for Z-scores than we had for leverage. In the first sub-period the level of significance for the estimated coefficients is lower than over the entire period, but the relationships are in the same direction. The relative consistency in the direction of the impact of the factors across sub-periods is reassuring.

For each year we estimate fixed time effects using dummy variables. These coefficients show how the average level of our dependent variables changes relative to our 1988 base for the overall period. As in Figure 1, we see that the leverage starts to increase in 1993. Possible explanations for this were discussed above. The estimated coefficients also demonstrate the same persistent decline in the Z-score in Figure 3 for our sample period. The decline was especially notable in 1992 and 1993. The relatively concurrent changes in the leverage and Z-score may be related to the same causes as discussed earlier so considering two sub-periods allows us to control for possible structural changes.

Empirical Results: Corporate Governance Variables

The results for the impact of our corporate governance related factors on leverage are presented in Table 4a. In the overall period, we do not find that leverage is impacted by the changing influence of employees on the supervisory board – none of the estimated coefficients on the D_{size} variables are statistically significant. This does not appear to support our initial hypothesis that employee representation on the supervisory board influences a firm's capital structure decision. We investigate possible non-linearities in this relationship in the next section.

Moving to the ownership information, we find several interesting relationships between leverage and both the identity and percentage holdings of the owners (Note: all of the results are relative to the base case – a widely held firm). Although not statistically significant, we find that privately owned firms are less levered than widely-held firms. When the largest owner is a private individual the firm's leverage decreases as their control increases (-1.4), but this reverses as the size of the shareholdings of the second major shareholder increases (0.5). These are not statistically significant but they are consistent with our hypothesis that when firms are privately owned the owners make decisions in a more risk-averse fashion. For example, as the control of the largest private shareholder increases, the owner's dependence on the firm increases (possibly as an investment or for their career) so the owner makes decisions to ensure firm survival. As a result the firm adopts a more conservative capital structure than would a more risk-neutral, widely-held firm. Having a second large shareholder may result in a change in the firm's strategy (e.g. the

adoption of a more profit-maximizing strategy) so an increase in the influence of the second largest shareholder results in an increase in leverage.

Firms owned by non-financial corporations do not appear to have significantly different leverage than widely held firms and there is little change as the percentage shareholdings of either the largest or second largest shareholders changes (0.7 and 0.1 respectively). Non-financial corporate owned firms having capital structures similar to those of widely held firms is not surprising since these firms are likely being run based on the incentives of a broad set of stakeholders as is the case for widely-held firms.

The firms in our sample that are owned by foreign firms have more debt than widely held firms. The leverage increases as the control of the largest shareholder increases (2.3) but decreases as the influence of the second major shareholder increases (-1.3). There are several possible explanations for this finding. One of the most likely is that when foreign owners have a large controlling interest they do not wish to dilute their ownership stake, so they are willing to take on more debt to meet growing capital requirements rather than to issue more equity. However, as the largest foreign shareholder's control decreases, the firm is run more like a widely-held firm and thus it takes on less debt.

In general government ownership results in firms with lower leverage than widely-held firms. Since firms owned by the government (or with the government as a major shareholder), should have improved access to capital, this result is somewhat surprising. Because the objectives of government-owned firms are not necessarily the same as those of other firms, there are many possible explanations for this finding. One explanation is that government ownership implies either implicit or explicit guarantees which allow the firms to access funds as required, so the firms do not have to maintain as much debt in their capital structure. Another explanation is that the government's political and social objectives may not be consistent with debt financing.

We find that the leverage of firms owned by banks decreases as the ownership of the largest shareholder increases (-2.6), but increases as the holdings of the second largest shareholder increase (2.8). Although bank ownership may increase the firm's access to debt financing, this finding suggests that as the bank's direct control increases it is less likely to use this form of financing. This supports the view that increasing bank ownership allows the bank to benefit more from firm profitability than from the interest on loans. It is also possible that bank-owned firms have such ready access to capital that they can afford to carry less debt. But when the power of the second largest shareholder increases, the objectives of the firm change. The firms borrow more as the control of the second largest shareholder increases so

the firms appear to start to adopt capital structures which more closely resemble those of widely-held firms. As with the other types of owners, it appears that the bank itself may have certain objectives but it must increasingly reconcile these with those of other shareholders as the control of the other shareholders increases.

For the Z-score in Table 4b, we find that although the risk of bankruptcy decreases as firm size increases, the rate of decrease falls as the number of employees crosses the 500, 2,000 and 2,500 thresholds. This goes counter our hypothesis that firms with the largest role for employees on their supervisory boards would be the least risky. It is, however, consistent with Gorton and Schmid (2000b) who find that the firms' level of systematic risk increases as the degree of codetermination increases. Gorton and Schmid argue that this may be the result of employees resisting beneficial initiatives (e.g. restructuring) because of the possibly negative impact on jobs.

Considering the impact of the identity and concentration of major shareholders on the risk of bankruptcy, we find several similarities with our previous results. For privately owned firms we find that the risk of bankruptcy decreases as the percentage ownership of the largest shareholder increases (2.1). This is consistent with our previous finding where we suggested that as the stake of the largest shareholder increases, the firm/owner becomes more risk-averse and they are more concerned with firm survival. As a result these firms have both lower leverage and a higher Z-score (lower probability of bankruptcy). Not surprisingly as the holdings of the second largest shareholder increase, the risk of bankruptcy increases (though not significantly). This indicates that as the power of another major shareholder increases, the firm's objectives may shift from risk aversion toward profit maximization which may increase the riskiness of the firm.

The risk of bankruptcy for firms owned by non-financial corporations decreases as their percentage ownership increases (2.1). The addition of a second large shareholder does not impact the risk significantly (-0.3). It appears, therefore, that increasing corporate ownership is a good thing from a risk perspective. Since this decrease in risk is relative to widely-held firms, this may imply that corporately owned firms are different from widely-held firms. Even though their leverage is similar, corporately owned firms may have been established to accomplish a particular function so their owners are interested in ensuring the survival of this firm thus they have less risky profiles.

The level of risk for foreign-owned firms decreases somewhat as the control of the largest and second largest shareholders increase (1.0 and 1.6 respectively). Although at most weakly significant,

these results suggest that foreign-owned firms are slightly less risky than widely-held firms. The foreign owner may be using this firm to enter the German market so the foreign firm wants to ensure the firm's survival. This is consistent with the discussion for capital structure where we discussed the importance of the German firm to the foreign owners and thus their interest in maintaining control through their capital structure choices.

Not surprisingly, we find that increased government ownership is related to a higher apparent risk of bankruptcy (-1.7). The risk was relatively unchanged by the size of the holdings of the second largest shareholder (0.1). This suggests that government ownership, by itself, impacts the firm's decisions. This is similar to the finding for capital structure and suggests that government ownership allows firms to maintain financial structures which would be unsustainable for other firms. Since the relationship does not change significantly as the second largest shareholder's power increases, this indicates that the presence of other large shareholders can not change this. The main impact is that as the government's control decreases, the unusual incentives or ability to maintain such risky financial structures decreases.

Once again firms owned by banks are interesting. These firms have an increasing risk of bankruptcy as the holdings of the bank as the largest shareholder increases (-1.9) but this risk decreases as the power of the second largest shareholder increases (2.0). These results suggest that firms owned by a financial institution are either near financial distress (this may explain their being owned by the bank) or they are able to maintain financial structures which other firms could not. The presence of the second largest shareholder, however, no longer permits this. These results are consistent with our findings for leverage where bank ownership may allow firms to make different financial decisions than other firms, but in both cases this difference decreases as the bank's control decreases.

These patterns were relatively stable across sub-periods with the main difference being the level of significance so we do not discuss them in detail. In general our results are consistent with our hypotheses and suggest a significant interaction between the characteristics of the shareholders, their voting power on the supervisory board and the firm's financial condition.

Overall the results from the estimation of our full model suggest that the identity and voice of different stakeholders do have a significant impact on our measures of firm risk. Factors related to codetermination are weakly related to our measures of firm risk, especially the Z-score but not in the expected direction. The strength and identity of the largest shareholder impacts the capital structure and riskiness of the firm. But the strong role played by changes in the size of the second largest shareholder

suggests that both the presence and size of the voice of the second largest shareholder impact the financial decisions of the firm. In summary it appears that our set of corporate governance factors does play a role in explaining the financial characteristics of the firms.

Empirical Results: Non-linear Relationships

Since the relationships between our measures of firm risk and our set of explanatory factors are not necessarily linear, we investigate the robustness of our results to various other versions of model (2). A subset of the results is presented in Table 5.

Because of the high correlation between ln(sales) and some of our other factors, we start by excluding the size factor, ln(sales), from our set of controls. The results are presented in Table 5a and, not surprisingly, we see that the number of employees plays a significant role in explaining leverage – the leverage decreases as the level of codetermination increases[12]. The estimated impact for the other governance factors are only slightly affected by this change. Considering the results in Tables 4a and 5a as well as those in Figure 1, we suspect a possible non-linearity in the relationship between size, codetermination and leverage which we investigate below. After removing ln(sales) from the models for the Z-score, we find that the dummy variables for the number of employees are now insignificant. There was, once again, little impact on the governance factors. The original results in Table 4b demonstrate that the risk of bankruptcy decreases as ln(sales) increases but the rate of decrease depends on codetermination so we also estimated a model excluding the codetermination variables. We find that the impact of codetermination is secondary to the impact of size. We also estimated a model allowing for an interaction between size and the number of employees, but the results provide little extra insight so they are not presented.

To investigate a possible U-shape in the relationships between our control variables and our measures of firm risk, we add quadratic terms for each of our control variables to the model. In the first columns of Table 5b we find evidence of a U-shape between leverage and size. As the size of the firm increases there is initially a decrease in leverage but as we approach the largest firms the leverage increases. This helps to reconcile the findings for leverage in Germany with those of studies in other

[12] Note: the results presented in Table 5 exclude the estimated effects for industry and years to conserve space in presentation. Nevertheless, these factors were included in the estimated model.

countries where leverage increases as firm size increases. However, it indicates that, in Germany at least, this is not a simple linear relationship[13]. When we look at the estimated coefficients on the number of employee dummies (our measures of codetermination), we find that the leverage decreases as the employee representation on the supervisory board increases – as originally hypothesized. The impact of owner identity and power on leverage remain relatively unchanged by this transformation. For the risk of bankruptcy (Z-score), we find some evidence of non-linearities in the relationships but they are not as economically significant as for the capital structure.

The previous results indicate that as the level of codetermination increases, we observe changes in both leverage and the risk of bankruptcy for the firms in our sample. We investigate different specifications of our model to ensure that our conclusions are robust to potential biases related to the correlation between firm size and the levels of codetermination. The results from these specifications find that the findings that leverage decreases and the risk of bankruptcy actually increases as the level of codetermination increases are robust to these different specifications.

To investigate how the level of shareholder control impacts firm decisions, we estimate several different models. We start by considering how the results are impacted by considering cases in which the largest shareholder has a controlling interest (> 50%) in Table 5c. Using a dummy variable for the largest shareholder having 50% or more of the equity, we find significantly higher leverage for foreign firms and significantly lower leverage for government and bank-owned firms (2.3, -3.1 and -1.7 respectively). For the Z-score we only find that government-owned firms are riskier (-2.4). This is consistent with the results from our original model. We supplement this model by considering the counteracting influence of a large second shareholder (e.g. a second shareholder with a holding of 25% or more). In Table 5d, the results are similar to those in Table 4. The only difference is that the second major shareholder has a greater influence on firm risk for privately-held firms. These results are robust to the use of other thresholds.

Although not presented, we also investigated the possibility of U-shape relationships between our measures of firm ownership and our measures of risk by considering the percentage ownership for the largest and second largest shareholders as well as their squared values. Studies such as Morck, Shleifer and Vishny (1988) and McConnell and Servaes (1990) suggest such a U-shape may exist for the influence

[13] Note: the non-linearity is robust to the exclusion of the codetermination variables.

of different types of owners on firm decisions. As in Edwards and Nibler (2000), we only find very weak evidence of a U-shape in these relationships so we do not present the results.

5. Conclusion:

In this study we investigate the ability of different stakeholder groups to influence the financial decisions of German firms. As corporate governance related issues have started to become more important to investors, understanding the potential influence of different stakeholders on firm decisions has increased in importance. To investigate the role of different stakeholders in firm's financial decisions, we use Germany because Germany's corporate governance system is an "insider" based system which has resulted in it providing stakeholders with well-defined roles in the corporate decision-making process. We take advantage of this in our study and investigate their impact on one of the frequently proposed advantages of this system: firms making decisions to ensure long-run stability. We measure firm risk using the firm's capital structure and its Z-score (Altman (1968)).

We find evidence that variables related to the German corporate governance system do influence the riskiness of German firms, even after correcting for factors known to influence firms' financial decisions from previous studies. The impact of employee representation on firm's capital structure is weak using our initial simple tests, but after allowing for non-linearities we find that increasing employee representation does result in lower leverage. This suggests that firms with the largest employee representation on the board may be trying to avoid the risk associated with debt. Our evidence of the non-linearity in the relationship between size and leverage also allows us to reconcile the finding that leverage decreases as firm size increases in Germany with the opposite finding in other countries. Specifically we find that the relationship in Germany is U-shaped: firm leverage initially decreases as firm size increases but then starts to increase for very large firms. These results confirm our hypothesis that increasing employee representation results in less risky capital structure choices and suggest that the relationship between size and leverage may be more complex than originally believed, in Germany at least.

Looking at the Z-scores, on the other hand, we find that after correcting for firm size and other factors the level of riskiness is actually highest for firms with the largest employee representation. This only becomes clear after correcting for the significant impact of size on firm risk. Size has the primary influence on risk with codetermination being a secondary, but still significant, effect.

We find interesting relationships between the type of owner, the size of their holdings and our measures of firm risk. We find that private firms are among the least risky and government-owned firms among the most risky firms. However, the nature of these relationships depends on both the size and identity of the two largest shareholders. For example, when a bank is the largest shareholder the firm has low leverage and the leverage decreases as the size of the bank's holdings increases but the leverage increases as the holdings of the second largest shareholder increase. These results suggest that the bank's incentives may be different from those of other types of owners but the bank's ability to influence decisions to optimize their utility changes as the power of the second shareholder increases. As the second largest shareholder's ownership increases, the firm's objectives appear to return to something closer to profit-maximization.

By considering both the identity and size of the holdings of different types of shareholders, our results are able to confirm the hypotheses of recent studies suggesting that the presence of a second major shareholder may impact firm's decisions. The incentives for the major shareholder and thus how they influence our measures of firm risk depend on their identity and their control, but the firm's objectives appear to converge regardless of the type of owner as the power of the second largest shareholder increases. Similarly we find that the presence of employees on the supervisory board influences firm risk.

The unique corporate governance structure in Germany allows us to measure the influence of different stakeholders on firm decisions more clearly than in other countries. Consequently our results suggest directions in which studies in the U.K., U.S. and other Anglo-American countries can build to better understand the impact of shareholder activism and ESOPs on corporate decision making.

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Figure 1:

The average of the Debt to Total Assets for all of the non-financial German firms listed on Datastream in each year from 1988 to 2000. The value for the Debt was the total value of Debt and equivalents. The value of total assets is determined as the sum of the different asset classes. The provisions for pensions and other special reserves are classified as debt.

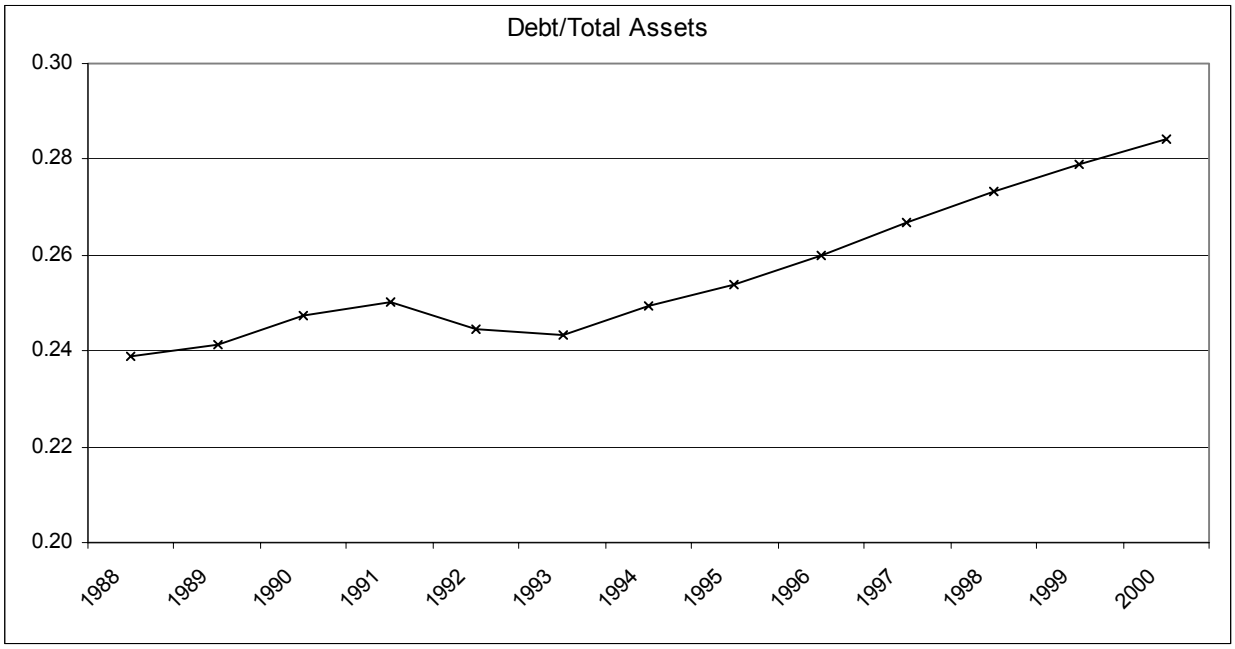

Figure 2:

The average of the Debt to Total Assets for all of the German non-financial firms listed on Datastream over the period from 1988 to 2000. The value for the Debt was the total value of Debt and equivalents. The value of total assets is determined as the sum of the different asset classes. The provisions for pensions and other special reserves are classified as debt. These are the average leverage (y-axis) for firms with the corresponding number of employees (the x-axis).

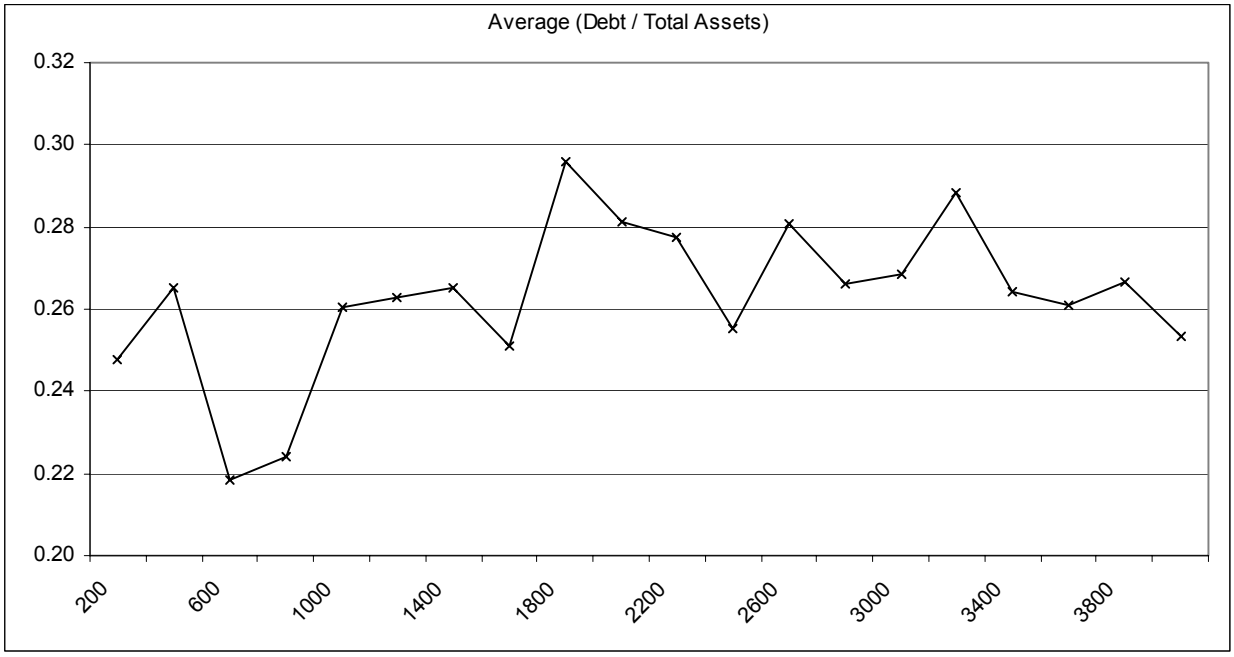

Figure 3:

The average risk of bankruptcy as determined using the Z-score (Altman (1968)) for the non-financial German firms listed in DataStream over the period from 1988 to 2000. The values are calculated using accounting data from DataStream according to the formula: Z = 1.2×(Working Capital / Total Assets) + 1.4×(Retained Earnings / Total Assets) + 3.3×(EBIT / Total Assets) + 0.6×(Market Value of Equity / Total Liabilities) + 1.0×(Sales / Total Assets).

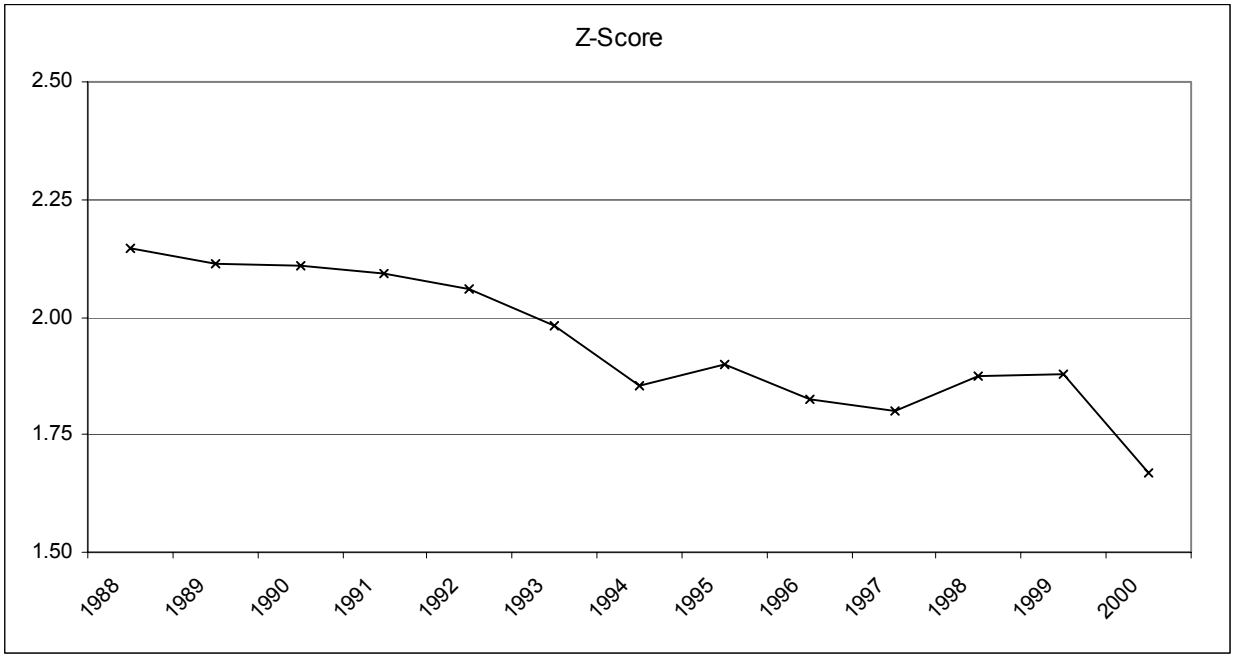

Table 1:

Descriptive statistics for the ownership structure of all of the German non-financial firms listed on Datastream over the period from 1988 to 2000. The ownership information was obtained from Commerbank's *Wer Gehoert zu Wem* over the same period for each firm available in the sample of the given year.

a) Percentage of firms with the given type of investor as its major shareholder as classified in *Wer Gehoert zu Wem*:

	Percent ownership (by type)
Private	38
Diverse	4
Company	38
Foreign	11
Government	5
Bank	4

b) Average percentage shareholdings of the largest and second largest shareholders from *Wer Gehoert zu Wem*:

Largest shareholder	Mean	Std Dev	Largest > 50% Percent of firms
Private	51.9	25.1	58%
Company	66.1	28.5	72%
Foreign	60.2	32.0	62%
Government	62.7	23.8	75%
Bank	45.8	25.4	43%

Second largest shareholder	Mean	Std Dev	Second > 25% Percent of firms
Private	16.6	9.4	22%
Company	17.6	10.6	32%
Foreign	16.1	10.5	15%
Government	20.4	12.7	50%
Bank	18.6	8.8	43%

Table 2

Descriptive statistics for the control variables used in Model (2) for all of the German non-financial firms listed on Datastream over the period from 1988 to 2000. The data was obtained from Datastream.

	mean	Std Dev	Min	Max
Ln(sales)	12.025	2.276	0.693	18.826
VolOpPi	3.337	23.425	0.000	492.087
Herf	0.158	0.142	0.053	0.999
R&D_Sales	0.284	0.456	0.000	1.004
CapExAssts	0.066	0.157	0.000	1.000

Table 3:

Correlations between the different control factors, dummies for employee representation on the supervisory board and type of owners. The control factors are ln(sales) is the log of sales, VolOpPi is the historical volatility of the firm's profits, Herf is the Herfindahl index, R&D_Sales is the ratio of R&D expenditures to sales, CapExAssts is the ratio of capital expenditures to total assets, Demp represents the firms with 1/3 (med) and ½ representation on their boards (xl) and Private, Div, Company, Foreign, Gov and Bank represent the type of the largest owner.

	ln(sales)	VolOpPi	Herf	R&D_Sales	CapExAssts	Demp_med	Demp_xl	Private	Div	Company	Foreign	Gov	Bank
ln(sales)	1.000	0.351	-0.155	0.159	-0.147	-0.161	0.732	-0.168	-0.096	0.136	0.049	-0.088	0.147
VolOpPi		1.000	0.016	0.048	-0.022	-0.124	0.244	-0.075	-0.015	0.059	-0.020	0.042	0.040
Herf			1.000	0.095	-0.033	-0.104	-0.050	0.040	0.027	-0.102	-0.009	0.197	-0.069
R&D_Sales				1.000	0.512	-0.067	-0.047	0.209	0.059	-0.187	0.034	-0.080	-0.082
CapExAssts					1.000	-0.030	-0.050	-0.056	-0.024	0.049	-0.012	0.016	0.026
Demp_med						1.000	-0.520	0.031	-0.055	0.018	0.061	-0.023	-0.125
Demp_xl							1.000	-0.156	0.008	0.064	0.007	-0.024	0.179
Private								1.000	-0.154	-0.615	-0.280	-0.174	-0.162
Div									1.000	-0.154	-0.070	-0.044	-0.041
Company										1.000	-0.280	-0.174	-0.162
Foreign											1.000	-0.079	-0.074
Gov												1.000	-0.046
Bank													1.000

Table 4:

An investigation of the role played by the different control factors and our factors related to corporate governance in explaining the observed leverage and the risk of bankruptcy, Z-score. The model is estimated using the mixed model described by equation (2) over the full sample period 1988 to 2000 as well as over the two sub-periods 1988 to 1993 and 1994 and 2000.

a) Debt to Total Assets

	1988-2000		1988-1993		1994-2000	
Parameter	Estimate	T-statistic	Estimate	T-statistic	Estimate	T-statistic
Intercept	3.65E-01	6.88	2.43E-01	3.07	3.72E-01	6.02
ln(sales)	-6.35E-03	-2.41	4.66E-03	1.17	-8.01E-03	-2.46
VolOpPi	-1.39E-08	-1.07	-1.33E-08	-1.15	-1.47E-08	0.84
Herf	-1.07E-01	-1.91	-1.34E-01	-1.41	-1.01E-01	-1.56
R&D_Sales	-1.28E-01	-1.14	3.08E-01	0.95	-1.46E-01	-1.20
CapExAssts	-2.84E-01	-13.65	-2.70E-01	-9.18	-2.74E-01	-9.39
D_SIC1	3.92E-03	0.10	2.48E-02	0.42	-1.49E-03	-0.03
D_SIC2	-1.20E-02	-0.27	-9.79E-03	-0.15	-7.42E-03	-0.15
D_SIC3	-7.47E-03	-0.21	6.42E-03	0.12	-7.08E-03	-0.17
Demp_med	-7.42E-03	-1.02	-2.17E-02	-2.11	5.42E-03	0.53
Demp_l	-5.43E-03	-0.52	-1.03E-02	-0.69	2.49E-03	0.17
Demp_xl	-1.25E-02	-1.16	-2.40E-02	-1.59	7.40E-03	0.49
Private1	-3.90E-04	-1.41	-5.00E-04	-1.50	-2.80E-04	-0.90
Private2	4.44E-04	0.54	1.36E-03	1.33	5.67E-04	0.63
Company1	1.60E-04	0.71	-1.80E-04	-0.69	3.94E-04	1.56
Company2	8.10E-05	0.11	5.90E-05	0.07	1.46E-04	0.17
Foreign1	6.92E-04	2.26	1.84E-04	0.53	1.08E-03	3.13
Foreign2	-1.70E-03	-1.25	-2.39E-03	-1.63	-9.40E-04	-0.61
Gov1	-1.12E-03	-1.94	-1.06E-03	-1.76	-9.90E-04	-1.50
Gov2	-2.45E-03	-1.61	-2.09E-03	-1.34	-2.58E-03	-1.46
Bank1	-1.86E-03	-2.55	-2.29E-03	-2.82	-1.28E-03	-1.55
Bank2	5.78E-03	2.81	5.41E-03	2.47	4.48E-03	1.89
d_yr89	1.81E-03	0.36	1.27E-03	0.26		
d_yr90	5.06E-03	0.78	3.26E-03	0.53		
d_yr91	2.21E-03	0.30	-1.40E-04	-0.02		
d_yr92	-2.15E-03	-0.27	-4.69E-03	-0.62		
d_yr93	-4.56E-03	-0.53	-6.33E-03	-0.78		
d_yr94	1.71E-03	0.19	8.52E-04	0.10		
d_yr95	5.60E-03	0.60				
d_yr96	1.30E-02	1.33			6.38E-03	1.43
d_yr97	2.13E-02	2.16			1.32E-02	2.34
d_yr98	2.84E-02	2.89			1.89E-02	3.03
d_yr99	3.19E-02	3.17			2.32E-02	3.30
d_yr00	4.19E-02	4.08			3.33E-02	4.37
Likelihood		4618		2284		2165

b) Z-score

	1988-2000		1988-1993		1994-2000	
Parameter	Estimate	T-statistic	Estimate	T-statistic	Estimate	T-statistic
Intercept	-5.15E-01	-1.28	-1.21E+00	-1.72	-2.38E-01	-0.54
ln(sales)	2.51E-01	13.06	2.28E-01	7.06	2.11E-01	9.05
VolOpPi	-1.66E-07	-1.85	-4.06E-07	-1.88	-1.41E-07	-1.32
Herf	-6.63E-01	-1.61	-1.85E-01	-0.22	-7.59E-01	-1.64
R&D_Sales	-2.36E+00	-3.17	-3.58E+00	-1.19	-2.31E+00	-3.05
CapExAssts	-1.10E+00	-7.44	-8.75E-01	-4.23	-1.14E+00	-5.50
D_SIC1	9.86E-02	0.34	2.88E-01	0.54	6.98E-02	0.22
D_SIC2	-5.52E-01	-1.59	-4.10E-01	-0.70	-5.22E-01	-1.41
D_SIC3	1.42E-01	0.51	3.70E-01	0.76	8.08E-02	0.27
Demp_med	-2.53E-01	-4.44	3.64E-02	0.43	-2.21E-01	-2.80
Demp_l	-4.04E-01	-5.05	1.83E-02	0.16	-4.60E-01	-4.23
Demp_xl	-5.56E-01	-6.86	-1.25E-01	-1.08	-6.39E-01	-5.78
Private1	4.18E-03	2.07	1.25E-02	4.05	2.80E-03	1.37
Private2	4.23E-03	0.67	2.62E-03	0.28	4.61E-03	0.73
Company1	3.69E-03	2.12	9.51E-03	3.96	2.45E-03	1.36
Company2	-1.55E-03	-0.26	2.14E-03	0.27	4.78E-04	0.08
Foreign1	2.74E-03	1.02	6.44E-03	1.84	3.07E-03	1.11
Foreign2	1.65E-02	1.59	1.99E-02	1.52	1.34E-02	1.24
Gov1	-7.33E-03	-1.70	-5.81E-03	-0.99	-7.77E-03	-1.75
Gov2	7.28E-04	0.07	1.67E-02	1.19	-3.80E-03	-0.33
Bank1	-1.20E-02	-1.92	-6.07E-03	-0.83	-1.46E-02	-2.20
Bank2	2.91E-02	1.95	2.83E-02	1.61	3.80E-02	2.40
d_yr89	-1.94E-02	-0.48	-3.48E-02	-0.95		
d_yr90	-6.91E-02	-1.36	-9.97E-02	-2.19		
d_yr91	-1.22E-01	-2.10	-1.51E-01	-2.87		
d_yr92	-1.93E-01	-3.08	-2.20E-01	-3.82		
d_yr93	-2.54E-01	-3.79	-2.78E-01	-4.47		
d_yr94	-3.78E-01	-5.41	-4.01E-01	-6.16		
d_yr95	-3.57E-01	-4.93				
d_yr96	-4.16E-01	-5.56			-5.22E-02	-1.54
d_yr97	-4.65E-01	-6.13			-1.13E-01	-2.66
d_yr98	-4.51E-01	-5.94			-1.10E-01	-2.36
d_yr99	-4.70E-01	-6.05			-1.30E-01	-2.47
d_yr00	-6.27E-01	-7.89			-2.86E-01	-5.03
Likelihood		1824		693		1245

Table 5:

An investigation of the role played by the different control factors and our factors related to corporate governance in explaining the observed leverage and the risk of bankruptcy, Z-score. The model is estimated using the mixed model described by equation (2) over the full sample period 1988 to 2000 (Note: the estimated values for the industry dummies and the year dummies are suppressed to conserve space).

a) Full model with ln(sales) excluded from the model.

	Debt/Total Assets		Z-Score	
Parameter	Estimate	T-statistic	Estimate	T-statistic
Intercept	2.40E-01	2.76	2.66E+00	4.11
VolOpPi	1.01E-08	0.44	-4.06E-08	0.66
Herf	-6.58E-02	-0.95	-1.13E+00	-2.10
R&D_Sales	1.05E-01	4.80	-1.61E+00	-2.20
CapExAssts	-2.65E-01	-13.52	-1.57E+00	-10.66
Demp_med	-1.20E-02	-1.80	4.63E-02	0.86
Demp_l	-1.53E-02	-1.58	3.40E-02	0.45
Demp_xl	-2.79E-02	-3.04	1.24E-02	0.18
Private1	-2.00E-04	-0.74	1.66E-03	0.87
Private2	3.86E-04	0.48	5.12E-03	0.85
Company1	2.64E-04	1.21	2.86E-03	1.74
Company2	6.10E-05	0.08	3.09E-03	0.54
Foreign1	7.23E-04	2.41	3.23E-03	1.28
Foreign2	-1.47E-03	-1.10	1.70E-02	1.74
Gov1	-1.09E-03	-1.92	-1.13E-02	-2.75
Gov2	-2.01E-03	-1.33	-2.59E-03	-0.25
Bank1	-1.52E-03	-2.11	-1.46E-02	-2.48
Bank2	4.50E-03	2.21	4.31E-02	3.06
Likelihood		4613		1809

b) Full model but quadratic terms are added for the control variables.

	Debt/Total Assets		Z-Score	
Parameter	Estimate	T-statistic	Estimate	T-statistic
Intercept	8.88E-01	7.79	-1.99E+00	-2.39
ln(sales)	-1.12E-01	-8.38	5.52E-01	5.79
ln(sales)^2	4.65E-03	8.00	-1.33E-02	-3.21
VolOpPi	-4.64E-09	-1.43	-3.61E-07	-2.06
VolOpPi^2	6.28E-16	1.32	5.82E-14	1.63
Herf	-3.64E-01	-2.09	4.58E-02	0.03
Herf^2	2.83E-01	1.75	-9.00E-01	-0.69
R&D_Sales	3.12E-02	0.16	-5.48E+00	-4.16
R&D_Sales^2	-2.06E-01	-0.82	4.98E+00	3.00
CapExAssts	-2.28E-01	-5.56	-6.55E-01	-2.09
CapExAssts^2	-1.45E-01	-2.12	-7.27E-01	-1.43
Demp_med	-7.71E-03	-1.07	-2.46E-01	-4.33
Demp_l	-1.26E-02	-1.20	-3.69E-01	-4.62
Demp_xl	-3.01E-02	-2.74	-5.00E-01	-6.09
Private1	-1.30E-04	-0.45	3.41E-03	1.79
Private2	4.40E-04	0.54	4.70E-03	0.79
Company1	2.86E-04	1.28	3.06E-03	1.88
Company2	5.30E-05	0.07	-1.15E-03	-0.20
Foreign1	8.12E-04	2.67	3.37E-03	1.34
Foreign2	-1.12E-03	-0.83	1.31E-02	1.35
Gov1	-1.02E-03	-1.76	-7.87E-03	-1.93
Gov2	-2.47E-03	-1.62	-2.83E-03	-0.27
Bank1	-1.81E-03	-2.49	-1.07E-02	-1.84
Bank2	4.56E-03	2.21	3.39E-02	2.42
Likelihood		4630		1801

c) Full model but the ownership is only contained for the largest shareholder when it has >50% and the second largest shareholder's ownership information is omitted.

	Debt/Total Assets		Z-Score	
Parameter	Estimate	T-statistic	Estimate	T-statistic
Intercept	3.40E-01	3.69	-2.61E-01	-0.39
ln(sales)	-6.32E-03	-2.40	2.46E-01	12.85
VolOpPi	1.35E-08	1.21	-1.75E-07	-1.63
Herf	-8.76E-02	-1.27	-8.05E-01	-1.55
R&D_Sales	-1.19E-01	-1.06	-2.03E+00	-2.77
CapExAssts	-2.83E-01	-13.63	-1.11E+00	-7.55
Demp_med	-8.01E-03	-1.10	-2.43E-01	-4.27
Demp_l	-6.27E-03	-0.59	-3.89E-01	-4.88
Demp_xl	-1.41E-02	-1.30	-5.43E-01	-6.70
Private1_50	-2.30E-04	-1.07	2.25E-03	1.47
Company1_50	2.24E-04	1.33	1.49E-03	1.14
Foreign1_50	6.15E-04	2.31	3.61E-03	1.54
Gov1_50	-1.49E-03	-3.11	-8.82E-03	-2.44
Bank1_50	-1.05E-03	-1.72	-7.76E-03	-1.42
Likelihood		4597		1798

d) Full model, but the ownership information for the second largest shareholder is only included when the owner has >25% holdings.

	Debt/Total Assets		Z-Score	
Parameter	Estimate	T-statistic	Estimate	T-statistic
Intercept	3.44E-01	3.72	-3.18E-01	-0.47
ln(sales)	-6.49E-03	-2.46	2.45E-01	12.78
VolOpPi	1.35E-08	0.62	-1.68E-07	-0.79
Herf	-8.80E-02	-1.28	-8.08E-01	-1.55
R&D_Sales	-1.26E-01	-1.13	-1.94E+00	-2.65
CapExAssts	-2.83E-01	-13.65	-1.11E+00	-7.51
Demp_med	-7.75E-03	-1.07	-2.37E-01	-4.15
Demp_l	-5.77E-03	-0.55	-3.81E-01	-4.77
Demp_xl	-1.31E-02	-1.21	-5.35E-01	-6.60
Private1	-3.20E-04	-1.21	3.66E-03	1.96
Company1	2.12E-04	1.01	2.81E-03	1.75
Foreign1	6.53E-04	2.24	3.52E-03	1.42
Gov1	-1.39E-03	-2.67	-8.49E-03	-2.14
Bank1	-7.90E-04	-1.30	-3.01E-03	-0.57
Private2_25	1.79E-03	1.81	9.29E-03	1.23
Company2_25	6.15E-04	0.74	1.05E-03	0.16
Foreign2_25	-1.75E-03	-1.04	2.84E-02	2.13
Gov2_25	-1.65E-03	-1.13	-1.51E-03	-0.14
Bank2_25	3.36E-03	1.44	1.65E-03	0.10
Likelihood		4603		1804