THE EXTENT OF INDUSTRY INFLUENCE ON CAPITAL STRUCTURE: EVIDENCE FROM UK COMPANY DATA

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Abstract: One of the points made by critics of Modigliani and Miller's capital structure irrelevance propositions was that companies in various industries appear to use leverage as if there is some optimum range suitable for each industry group. While theory prescribes that the industry related capital structure pattern is caused by similar levels business risk among firms in an industry, most prior empirical studies have either ignored or taken the relationship as given. The literature is full of other methodological anomalies, which could be the cause for observed inconsistent results. Inappropriate sample selection, use of broader industry classification, use of very small samples, coverage of shorter periods, use of a single measure of gearing, and the use of parametric tests to the preclusion of non-parametric tests without testing the data for normality, are but a few examples of methodological deficiencies in prior empirical research. This study examines the industry-related capital structure pattern in UK companies, and whether such a pattern persists over time. In doing so the study also attempts to establish the extent to which business risk and technology exert influence on industry related capital structure pattern. With hindsight, the study tries to avoid deficiencies observed in prior research by using eight different measures of gearing on a panel data of 570 UK firms for the 1985-2000 period. The result of both parametric and non-parametric tests show significant evidence that industry-related capital structure pattern exist. Industry classification explains between 10 and 34 percent of variation in gearing depending on the measure of gearing adopted. While at firm-level, business risk explains just below four percent of variations in firm gearing, at industry level, business risk explains up to 27% of that variation. The combination of business risk and technology explains up to 42% of variations in industry gearing. Throughout the 16-year period covered it is evident that gearing differences among industries are persistent over time regardless of the measure of gearing used.

JEL classification codes: G32.

Author Keywords: Capital structure, Industry influence, Panel data.

INTRODUCTION

For a long time financial economics literature has had references to the existence of a relationship between gearing and industry classifications. Both before and after the Modigliani and Miller (1958)-irrelevance propositions, a number of theoretical analysis, documented in both standard textbooks and in previous research works, have argued in favour of the existence of industry-related capital structure patterns (see for example Donaldson, 1957, pp. 331-347;). Indeed this was one of the points made by critics of Modigliani and Miller's irrelevance proposition that:

> "...companies in various industry groups appear to use leverage as if there is some optimum range appropriate to each group" (Solomon, 1963, p. 98).

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One of the areas, which commanded attention of researchers, is the existence of an optimal capital structure for firms in a given industry. Observations of capital structure in different industries points towards the existence of industry-related capital structure pattern as the following quotation suggests:

> "If debt policy were completely irrelevant, then actual debt ratios should vary randomly from firm to firm and industry to industry, yet almost all airlines, utilities, banks, and real estate developments rely heavily on debt. And so do many capital-intensive industries like steel, aluminium, chemicals, petroleum, and mining. On the other hand, it is rare to find a drug company or advertising agency that is not predominantly equity-financed" (Brealey and Myers, 2000, p. 499).

The argument for the existence of industry-related capital structure pattern is that an important determinant of the ability of a firm to carry debt lies in its operating earnings stability (business risk). This being the case, firms in the same industry, which by and large face similar supply and demand conditions, similar technology, similar tax status, will have roughly a similar level of business risk (Donaldson, 1957; Ozkan, 2001). The assumption is that competent managers facing those similar circumstances would arrive at roughly similar decisions as to debt level appropriate for those conditions, and these firms will have similar leverage ratios. Marsh (1982) suggested that the observed gearing differences among industries might be reflecting systematic industry differences in asset structure, risk, and other variables. The existence of industry related capital structure patterns and indeed the observations cited above brings into question the Miller's (1977) general equilibrium model, as it quashes the 'optimal level of aggregate debt in the economy' by replacing it with the optimal level of debt for a smaller group of firms and hence for an individual firm.

Previous empirical studies have assumed either explicitly or implicitly that business risk is the cause of industry-related capital structure pattern. This study examines the evidence regarding the existence of industry influence in capital structure in UK companies, and seeks to establish the extent to which both business risk and technology influence capital structure differences among industries. Unlike previous cross-sectional studies, this study also investigates whether differences in capital structure persists over time. A panel data of 570 non-financial UK firms is used. The period covers 16 years from 1985 to 2000. The findings support the dominant theory that capital structure differ among different industries and that business risk and technology explains a significant proportion of variation in industry gearing ratios. In general, both parametric and non-parametric tests indicate that market value based gearing measures are able to capture more (up to 42%) of industry influence in capital structure than book value based measures which capture about 10% of industry influence. The superiority of market based gearing measures is consistent with the capital structure theory and with some prior research (see Modigliani and Miller, 1958,1963; Taggart, 1977, and Bennett and Donnelly, 1993).

This paper proceeds as follows: In section two, the literature relating to industry influence on capital structure is reviewed. Section three provides a critique to the methodologies used by previous empirical studies in this area. The testable hypotheses are then discussed in section four. The data and methodology adopted in this study are then presented in section five. Section six documents and discusses the results from various tests conducted, and finally section seven concludes. Tables and figure are relegated to the appendix.

LITERATURE RELATING TO INDUSTRY INFLUENCE ON CAPITAL STRUCTURE

The results from previous empirical works have generally been contradictory. While Schwartz and Aronson (1967), Scott (1972), Scott and Martin (1975), Bowen, *et al* (1982), Bradley *et al* (1984), and Bennet & Donnelly (1993) reported significant differences in industry gearing, there exist almost an equal number of studies that decry the existence of any such significant differences. These include for example Wippern (1966), and Gupta (1969), Cherry and Spradley (1989).

Schwartz and Aronson (1967), which is considered to be one of the earliest empirical studies in this area, drew a sample of eight firms at random from each of the four broad industry classifications - railroads, gas and electricity utilities, mining and industrials - and measured the percentage of common stock equity, at book value, for 1928 and 1961. They reported relative stability of ratios within each classification, with persistent differences between classifications over time. This study was tainted by both the use of regulated industries in the sample, and the use of very broad categories of industries e.g. 'Mining and Industrials' as one industry (see Bowen *et al.*, (1982). Scott (1972) aimed at eliminating the bias caused by the predominance of regulated industries, Scott analysed data for 77 firms in 12 industries over the period 1959-1968. Excluding railroads and utilities, they measured leverage as the percentage of common equity to total assets, at book value, and concluded that various industries did, in fact, develop characteristically different financial structures.

In a subsequent study Scott and Martin (1975) selected both large and small firms from 12 industries, measuring leverage as the ratio of common equity to total assets, at book value. After a Bartlett test failed to establish homogeneity of variance among the industry groups, they used standard one-way analysis of variance (ANOVA) and its non-parametric counterpart, the Kruskal-Wallis one-way analysis of variance by ranks. Both the parametric and the nonparametric tests identified a statistically significant relationship between industry and leverage. Bowen, et al (1982) studied nine industries with 10 firms from each industry for the period from 1951 to 1969. They found significant differences in leverage between industries, and rankings of mean industry financial structure were stable over time, and that individual firms exhibited mean reversion tendencies towards their industry mean over both five-and 10-year periods.

Bradley *et al,* (1984) utilized 20-year average firm leverage ratios for 851 firms in 25 two-digit SIC industries, and performed a standard ANOVA using industry dummy variables, the study found that 54% of variation in firm leverage was being explained by industry classification. Excluding all regulated industries from the sample, the R-squared fell to 25%. In the UK, Bennett and Donnelly (1993) used Financial Times All-share industry classification to analyse a sample of 433 companies covering 19 industries over the 1977-1980 period and concluded that capital structures vary across industrial classification. Very recently Fan *et al.*, (2003) examined a cross section of 47 developed and developing countries between 1991 and 2000 and documented a significant industry effect in capital structure.

The findings of studies, which refute the existence of industry-related capital structure include Wippern (1966) who concluded that it was not possible to reject the hypothesis of equal capital structure ratios among eight industries except for regulated electrical utilities. Gupta (1969) used the ratio of total debt to total equity, at book value, of a number of manufacturing firms in two-digit SIC industries for 1961-1969. He found no significant relationship between a firm's leverage and its membership in a particular industry, and concluded that leverage is a function of multi-variate factors that have varying significance in different industries.

A study of gearing ratios in USA, Japan, Norway, France, and the Netherlands by Remmers, et al (1974), famously referred to in literature as RSWB (1974), utilized the 1971 Fortune 500 list, drew a sample consisting of all industries that had at least 20 firms (nine groups), analysed their data for 1966, 1970 and 1971, measuring leverage as the ratio of total debt to total assets, both at book value. Their study concluded that there was no support for the hypothesis that industry was a determinant of corporate debt ratios in manufacturing firms in the USA, Norway and the Netherlands, although industry group was a significant determinant in both France and Japan. Similarly Belkaoui (1975) reported that although there were industry-related capital structure patterns among some Canadian firms, the majority did not. Both Stonehill, *et al* (1975), a survey of financial executives in France, Japan, the Netherlands, Norway and the USA, and Sekely and Collins (1988) concluded that cultural factors rather than achievement of industrial norms played an important role in setting financial policy. In addition, Sekely and Collins (1988) found that although gearing levels were different among countries, industry group had no significant impact on gearing in 23 countries.

This part might not be complete without mentioning Ferri and Jones (1979) who used a sample of 223 firms in 10 industries for two five-year periods, 1969-1974 and 1971-1976, and concluded that although financial structure is not totally independent of industry classification, the dependence is at best, weak and modest. They also found no relationship between income variability and leverage. Cherry and Spradley (1989), took 59 firms from five industries and analysed data for the period from 1981 to 1985 and found that there is no statistically significant industry effect on the firm's leverage. Their analysis also failed to show any significant relationship between a firm's business risk and its average debt ratio. They therefore concluded that firms within most industries do not face a common level of business risk as has been generally assumed, and that business risk itself does not exert any significant influence on the firm's capital structure decision.

A UK study by Varella and Limack (1998) examined the capital structure for 112 companies encompassing nine UK industries from 1967 to 1986. Their study reports significant company gearing differences but not industry differences. They conclude that there is no optimal financial structure for firms in a given industry in the UK.

A CRITIQUE OF PREVIOUS STUDIES' SAMPLE SELECTION AND METHODOLOGIES

There are some weaknesses in previous studies, which need to be addressed in any rigorous study investigating industry-related capital structure pattern. With few exceptions, these earlier studies used broader industry classification. In terms of the Standard Industrial Classification (SIC) codes in the US, a four-digit SIC code would represent the finest available industry classification.[1] However, some previous studies used broader classification than four-digit, some like Schwartz and Aronson (1967) used 1 or 2 digits, and Scott (1972) used 1, 2 or 3 digits (See Bowen *et al,* 1982, p. 12). Fan et al. (2003) use 2-digit SIC codes and group SIC codes 52-59 in one broad industry group, 'Retail'. Ignoring the possibility of perverse results, which could arise, some of these studies like Schwartz and Aronson (1967) included even regulated industries, and Belkaoui (1975) included 'utilities industry' in his sample. Although a number of subsequent studies dropped regulated industries to conform with the 'current thinking' and also tested more industries, they did not make clear the basis on which firms were grouped together as an industry (Bowen *et al* (1982)).

In some cases the sample sizes were very small (ranging from 77, 59, and even 8 firms), and some of them covered relatively short periods (5, 4, 3 years, even 1 year) (See Scott, 1972, Cherry and Spradley, (1989) and Schwartz and Aronson, 1967 for examples of both anomalies). Resulting measures of gearing from such short periods may not be representative of long-term equilibrium gearing ratio and may be affected by short-term adjustments in capital structure. Smaller samples may also fail to generate significant results which can be inferred on large a population of firms (or industry) in an economy.

Methodologically and in terms of the depth of investigations most of studies are also found wanting. Bennett and Donnelly (1993) for example use only parametric tests without disclosing whether they tested their data for normality. Such use of parametric tests to the preclusion of nonparametric tests has been decried in related literature (see Varela and Limmack, 1998). With the exception of Ferri and Jones (1979), and Bowen *et al* (1982) most other studies do not examine whether their cross-sectional results are persistent over-time.

Most of these studies either ignored the relationship between business risk and industry leverage or assumed that the herding of industry ratios is a proxy for similar business risk within an industry (see Varella and Limack, 1998, p.8). Of all the studies cited above, only Ferri and Jones (1979) and Cherry and Spradley, (1989) explicitly test for the relationship between gearing and business risk. While the former found no relationship between earnings variability and gearing, the later found that business risk is only weakly related to a firm's membership in a particular industry. The results are mixed for studies, which had both small samples and also

[1] The SIC codes are stated in four digits where the first-digit corresponds to the broadest categories (ten in total). A two-digit code represents a narrower classification, a three-digit is even narrower, and a four-digit is the narrowest available classification.

covered shorter periods. Generally those studies that utilized reasonably larger samples, combined with coverage of longer periods of between ten to twenty years and large surveys reported significant evidence of the existence of industry-related capital structure. See Bradley et al, (1984), Bennett and Donnelly, (1993), and Bowen et al, (1982) for empirical studies, and Remmers et al (1974) for large surveys. Bowen et al (1982) draws attention to the interesting observation that those studies that used equity in the numerator of their gearing ratio found significantly differences in industry gearing while those that used debt did not.

The summary above seems to indicate that the existence or non-existence of industry-related capital structure pattern is not yet resolved. Equally interesting is that the results of these studies naturally leads us to question the widely held belief that the level of a firm's business risk is an important determinant of its debt carrying capacity. This study, among other things, embarks on finding evidence of the existence of industry-related capital structure pattern by using a sample of UK industrial companies. The study also looks at whether business risk and technology are important determinants of a firms (or an industry's) ability to carry debt, and whether the observed relationships are persistent over time. Table 1 in the appendix compares this study and selected similar previous studies.

HYPOTHESES ON INDUSTRY-RELATED CAPITAL STRUCTURE PATTERN

The general question here is: "If capital structure is relevant in the determination of the value of a firm, then firms in a given industry will seek an optimal capital structure and they will be seen adjusting towards this target debt ratio". We can also extend this expectation and say that, if a firm is influenced by its level of business risk (and technology) as approximated by industry classification, then the observed optimal capital structure will be significantly different across all industries. The specific hypotheses are given as hereunder:

1.1 $H_0 : \overline{L_i} = \overline{L_j}$ for all i and j

$H_1 : \overline{L_i} \neq \overline{L_j}$ for some i and j

Where L is the average ratio of a measure of gearing for a sample firm over the period 1985-2000, and $\overline{L}$ is the mean of the debt ratios for firms in the ith and jth industries.

1.2 $H_0 : \overline{SIGOITA_i} = \overline{SIGOITA_j}$ for all i and j

$H_1 : \overline{SIGOITA_i} \neq \overline{SIGOITA_j}$ for some i and j

Where $SIGOITA$ is the standard deviation of operating income, i.e. earnings before interest and tax scaled by total assets for a sample firm over the period 1985-2000, and $\overline{SIGOITA}$ is the mean of the $SIGOITA$ for firms in the ith and jth industries. The study also uses coefficient of variation in operating income i.e. earning before interest, tax and depreciation standard deviation (CVEBITDA) as an alternative to $SIGOITA$.

1.3 $H_0 : b = 0$

$H_1 : b \neq 0$

for the cross sectional regression equations:

$$\overline{L} = \alpha + b_1 X_1 + \varepsilon \qquad (1.0)$$

and,

$$\overline{L} = \alpha + b_1 X_1 + b_2 X_2 + \varepsilon \qquad (2.0)$$

where $\overline{L}$ is the computed measure of gearing for a firm, X_1 is the SIGOITA, X_2 is the ratio of fixed assets to total assets (FAn/Tan) net of both depreciation and intangibles for that firm (a proxy for production technology), and ε is the random error. Alternatively CVEBITDA may be used in place of SIGOITA as a measure of business risk.

To examine persistency of gearing ratios over time, eight different measures of mean debt ratios were computed for each of the 28 industries for every year from 1985 to 2000, these ratios were ranked for each single year.

The specific hypothesis tested here is:

1.4 H_0 :The relative industry-mean gearing rankings are random

H_1 :The relative industry-mean gearing rankings persist over time.

DATA AND METHODOLOGY

Data

The data was taken from DataStream, a database containing both accounting and market value data. In an effort to get the largest sample possible, all non-financial UK firms were taken from DataStream. This generated 1277 firms. From the sample of 702 companies identified as having appropriate variables only 570 companies were found to be relevant for purposes of investigating industry effect in capital structure. Some companies could not meet the criteria set. Firms were selected using the following criteria. Regulated firms and utilities like railway companies, electricity, gas, and telephone were excluded. Financials, like banks, insurance companies were also excluded. Only firms with at least 11 years of data were included. In addition, only industries, which had at least 10 firms, were included.

Empirical Analysis

In this part of study the methodology involves parametric tests like standard analysis of variance (ANOVA) combined with OLS multiple regression of industry dummy-variables, two-sample t-test, analysis of summary statistics, and analysis of industry gearing ratios over time. Despite having a relatively larger sample, the non-parametric test Kruskal-Wallis, is also used to take care of the data relating to some measures of gearing whose distribution did not appear to be normally distributed. From the initial sample of 702 non-regulated and non-financial firms, 45 industries were identified. Out of these, industries with only a handful of firms, and those, which did not have variables of interest to this study, were dropped. Only industries with at least ten firms were included on board. The final sample constituted 570 firms covering 28 industries. These industries were grouped according to DataStream classification (INDNUM and INDG) (see table 10 in the appendix), which was used because it provides an independent method of classifying companies into functionally defined industries.

Eight different measures of gearing were computed for all firms in all industries. Other variables of interest like Standard deviation standard deviation of operating income scaled by total assets (SIGOITA), and the coefficient of variation (C.V) of profit before interest, tax and provisions (EBITDA) which subsequently is referred to as CVEBITDA, and the ratio of fixed assets to total assets, FA/TA, were also computed for the entire final sample. The ratio of fixed assets to total assets is used here following the suggestions in the literature that capital intensity may be an indicator of production technology (See Rajan and Zingales, 1995; Boyle and Eckhold, 1996, p.9; and MacKay and Phillips 2002, p.10). Table 2 shows descriptive statistics for each of the ten gearing ratios and other variables used.

To test the first and the second hypotheses one-way analysis of variance (ANOVA) was run using the 28 industries as levels (treatments) in 28 columns. ANOVA was run for all eight measures of gearing for each of the 16 years (1985 to 2000). In addition ANOVA was run for cross-section values of SIGOITA and CVEBITDA. ANOVA is similar to regression in that it is used to investigate and model the relationship between a response variable and one or more exogenous variables. ANOVA differs from regression in that the exogenous variables are qualitative (categorical), in the case of this study; these are 'industry groups'. In ANOVA no assumption is made about the nature of the relationship, therefore the model does not include coefficients for variables. This is why in this study ANOVA is combined with OLS multiple-regression of industry dummy-variables, and the resulting t-statistics are matched with industry means and standard deviations. This process was done using the following equation:

$$Lev = \alpha + \sum_{i=1}^{28} \beta_i D_i + \varepsilon \tag{3.0}$$

Where:

Lev = gearing measure

D_i = the dummy variable representing industry i

ε = is the random error.

ANOVA extends the two-sample t-test for testing the equality of two population means to a more general null hypothesis of comparing the equality of more than two means (in the case of this study 28-means) versus them not all being equal. For one-way analysis of variance (AOVONEWAY), there is no need to have the same number of observations in each level. Being parametric tests, two-sample t-test and ANOVA assume that the sample is normally distributed. While simple histogram plots indicated that the data relating to the ratio of total liabilities to total assets (book-value) was normally distributed, other measures of gearing showed a slight departure from a normal distribution.

Non-parametric Tests

Despite using a relatively large sample and the fact that ANOVA can prove to be very robust to such modest departures from normality assumption, to ensure robustness of the results, a non-parametric test, Kruskal-Wallis, was also performed for all ten measures of gearing and for cross-section of other variables of interest (proxies for business risk and technology). Non-parametric tests do not rely on any assumption about the distribution of the parameters of interest. Specifically non-parametric methods were developed to be used in cases when the researcher knows nothing about the parameters of the variable of interest in the population. For this reason they are also known as *parameter-free or distribution-free* methods.

Non-parametric tests are resorted to because of the possibility that the normality assumption in parametric tests may render the conclusions misleading. The results from a non-parametric test are more robust against violations of the assumptions on which parametric tests rely on. Despite these differences, both parametric and non-parametric tests are procedures used to perform tests about population's measures of central tendencies, the mean for parametric test, and the median for non-parametric tests. Kruskal-Wallis particularly performs a hypothesis test of the equality of population medians for a one-way design in relation to two or more populations. This test is a generalization of the procedure used in Mann-Whitney test and like Mood's median test offers a non-parametric alternative to the one-way analysis of variance. The test looks for differences among the medians of the populations tested and assume that data arise as k independent random samples from continuous distributions, all having the same shape. Kruskal-Wallis hypotheses are:

H_0 : The industry medians are all equal
H_1 : The industry medians are not all equal.

This test is more powerful (the confidence interval being narrower, on average) than Mood's median test for analysing data from many types of distributions, including data from normal distribution.

To test for the influence of business risk, simple ordinary least square (OLS)-regression was run using SIGOITA as an independent variable. To test for the influence of both business risk and technology on gearing, multiple OLS-regression was run using SIGOITA and FA/Tan as independent variables. This process was done first at firm level (i.e. 570 firms, and then at industry level (28 industries). Finally, measures of mean debt ratios were computed for each of the 28 industries for every year from 1985 to 2000, these ratios were ranked for each single year. The relative rankings of these industries were observed for each measure of gearing to find out whether the rankings are random or whether industry rankings are persistent.

RESULTS

Overview

Table 4 shows a general picture of gearing in the UK. The mean and the median statistics for each of the ten measures of gearing employed are depicted in that table. There are also ratios for three previous studies for comparison purposes. Columns one to four relates to the current study. The overall mean and standard deviation is calculated from the whole sample of 702 companies using the cross-sectional data (1985-2000). The overall mean depicts, on average, the extent to which U.K companies are geared. Taking total liabilities to total assets for example the gearing is 51%. One notable feature is that current liabilities account for a significant 39% of total assets. It is therefore important to take this into account especially if the long-term debt and the short-term debt accounts for only 4% and 6% respectively. This means that current liabilities, on average, account for 76% (.39/. 51) of total liabilities. These results support those of Bevan and Danbolt (2000) who also found that the determinants of gearing vary significantly depending on the component of debt used. They found that 'credit and equivalent', which is similar to current liabilities in this study, accounted for more than 62% of total liabilities. The implications from these findings is that the results of any further analysis of gearing on the U.K companies will be sensitive to whether or not current liabilities are taken into account. Because of this, although this study uses other measures of gearing as well, the ratio of total liabilities to total assets is reported despite the possibility that current liabilities may not have much to do with financing decision as it may simply reflect operations of a business.

The medians of income gearing are also presented in addition to the means. Initially a total of 13 different measures of gearing were computed. Pearson's correlation revealed that some of them were highly correlated and some were dropped. For example, EBIT/I and EBITDA/I are almost perfect correlated to the extent that one can be dropped in further analysis. In the interest of space, further tests in this study only report results for selected eight measures of gearing.

Table 5 presents the industry range as well as the intertemporal range. The industry range presents the high and low gearing ratios and the industry identification number in brackets. This is the serial number given to the industry in the list of industries dealt with in this study in table 10. Industries 8, 16, and 20, which are Oil Exploration/Production, Motor vehicle: distribution, and Publishing, respectively, are on average, the most geared industries for most of the gearing measures, while industries 4, 11, and 27, which are Engineering Fabrication, Software, and Pharmaceuticals, respectively, had the lowest gearing for most of the gearing measures. Industry 13 and 12 (Household Appliances and Computer services industries) had the highest coverage (lowest income gearing) while industry 16, (Motor vehicle: distribution) had the lowest coverage ratio (highest income gearing).

The intertemporal range shows the highest and the lowest annual gearing ratios with the respective years in brackets. The sample includes some companies, which did not have relevant data from 1985 to 1988. This seems to be the reason why 1985-1988 accounted for most of the lowest ratios. To remove this bias, the last column shows the lowest ratios from 1989 onwards, as this is the period when all companies had relevant data. The interpretation of results also takes this into account. The highest total liabilities to total assets ratio, TL/TA, debt to capital ratio, D/CAP, debt to total assets, D/TA, long term debt to total assets LTD/TA, and short term debt to total assets, STD, occurred I 1999, 1998, and 2000, and (save for the 1985-1988 bias) the lowest of these ratios occurred in 1989, 1993, and 1997. The highest book debt equity ratio, occurred in 1992, the highest current liabilities, occurred in 1995, while the lowest of these three ratios occurred in 1989.

As for the income gearing (in terms of both the means and the medians) the highest gearing (the lowest coverage ratio) occurred in 1991-1992 while the lowest gearing (the highest coverage ratio) occurred in 1996-1997. Long-term debt financing was therefore highest in the 1998 through to 2000 years, and lowest in the 1989-93 and 1997 years. On average companies had the ability to service their debts in 1996-1997 years and had difficulties servicing debt in the 1991-1992 years. Table 5 reveals that generally total debt financing has been stable over the study period (1985-2000). Major fluctuations have been rare and there appear to be signs of mean reversion after approximately every five years.

Table 5 also shows two measures of operating risk, the ratio of the standard deviation of operating income scaled by total assets (SIGOITA), and the coefficient of variation (C.V) of profit before interest, tax and provisions (EBITDA) which subsequently is referred to as CVEBITDA. The industry range shows that on average, industry (11), Software, is the most risky based on both measures, and that industry (14) Furniture and Floor Covering, is the least risky based on CVEBITDA, and industry (18), Malt and Beverages, is the least risky based on SIGOITA. It may be worth mentioning that most of the overall (cross-sectional) ratios computed in this study are similar to the comparable ratios in two previous studies as shown in table 4.

Statistical Significance of Observed Differences

To test the statistical significance of the observed differences in the mean gearing ratios across industries, two related tests were conducted Two-sample t-test and standard one-way Analysis of Variance (ANOVA). Figure 11(a) shows the results of Anderson-Darling normality test which shows that the total debt to total liabilities ratios only depart slightly from a normal distribution in figure 11(b) which has been generated using random data. ANOVA is very robust to such modest departures from normality assumption. Tables 6.1 to 6.5 show the results of one-way ANOVA for four different measure of gearing, and also for SIGOITA, a proxy for business risk. The industry means gearing ratios are arranged ascending order. Statistically, book values of gearing shows that about 10% to 16% of variation in gearing is explained by industry influence, while market value measures explain up to 34%. Two-sample t-test was also conducted on each pair of all 28 industries; the resulting matrix (not shown) corroborates ANOVA results. The proportion of variation in gearing explained by industry classification compares favourably with the 25% reported by Bradley et al (1984) in the US, and also with 18% reported by Bennett and Donnelly (1993) in the UK. Table 6.5 shows that industry classification also explains up to 14% of variations in business risk. Table 6.5 also confirms that business risk is negatively related to gearing as highly geared industries like motor vehicles (distribution), motor vehicle (parts), food processors, publishing, malt and beverages, oil and gas, and construction, are also the industries with the lowest business risk (as measured by SIGOITA). On the other hand, the least geared industries like pharmaceuticals, software, computer services, and medical equipments, have the highest levels of business risk.

Table 7 shows results for Kruskal-Wallis test for all gearing measures employed in this study. With $k - = 27$ degrees of freedom and $\alpha = 0.01$ in the upper tail of Chi-square distribution, the critical chi-square value is $\chi^2 = 46.9630$. Since the test statistic (H) in each case is greater than 46.96, the null hypothesis that the industry medians are all equal is rejected. This non-parametric test strongly supports the existence of significant differences in capital structure among UK industries. Consistent with the results found by using parametric tests (ANOVA) is that the differences are more pronounced for market value measures. Consistent with Bennett and Donnelly (1993), this suggests (as the theory prescribes) that market values should be given priority in future research. As table 7 shows, non-parametric tests also reveal that there are significant differences in the level of business risk among industries. The Kruskal-Wallis test statistic (H) is 117.56 and 78.49 for SIGOITA and CVEBITDA respectively. Both of these are higher than the critical Chi-square value of 46.96.

The results of explicit tests as to whether the observed differences in industry capital structure relate to differences in industries' operating risk, and technology tables 8.1 to 8.4 show regression coefficients for both simple and multiple OLS regression (cross-sectional) of eight different debt ratios vs. SIGOITA and FAn/TA. Although most of the regression coefficients are significant at 1% and 5%, the results indicate that at firm-level both business risk and technology do not explain much, as only 3.7% of variation in gearing is explained by the business risk, and 5.1% is explained by the combined effects of both business risk and technology on firm gearing (excluding the influence of current liabilities, CL/TA). At industry level, business risk explains up to 27.3 percent. The combined influence of business risk and technology explains up to 42.4 percent of variations in industry gearing.

To examine the persistency of industry debt ratios over time, industry mean debt ratios were computed for each of the 28 industries for every year from 1985 to 2000. Table 9.1 to 9.4 show the rankings of four different industry mean gearing ratios of the 28 industries from 1990 to 2000 in descending order. During the period from1985 to 1989 some of the companies included in our sample did not have relevant data therefore the industry mean debt ratios for that that period would be biased towards (against) those industries whose firms have (have no) data.

In addition to the obvious picture that Motor vehicle: distribution, which ranked first on average, also ranked first in three years out of 11 years, for more than 50% (for some 91%) of the time, the first three industries were within three positions of their average ranking. These industries did not fall below the tenth position in any of the 11 years. Those industries, which were the last three on average, were within their average position for more than 64% (Retail: multi-departments was there for 100%) of the time. Three industries, which on average occupied the middle positions, were within three positions of their average for at more than 54%. In general, the rankings for other measures of gearing, shown in table 9.2 through 9.4 also exhibit persistence of differences over time, as industries like motor vehicles (parts), motor vehicles (distribution), food processors, publishing, oil and gas and chemicals have relatively higher levels of gearing in each year for all measures of gearing. On the other hand, industries like pharmaceuticals, computer services, household appliances, Engineering fabrication, and Retail (multi-department), consistently show lower levels of gearing.

The relative stability of industry rankings over time supports the findings of Bowen et al., (1982) but contradicts those of Ferri and Jones (1979).

CONCLUSION

The study examines the evidence of the existence of capital structure differences among industries and whether these differences are due to corresponding differences in business risk and technology as prescribed by capital structure theory. Further, the study investigated whether industry capital structure differences persist over time. A sample of 570 firms covering 28 industries is used, whereby eight different gearing measures are analysed and tested against the proxies for business risk and technology. Both parametric tests (ANOVA), and non-parametric (Kruskall-wallis) tests were carried out, and tests were conducted at firm as well as industry levels.

Contrary to previous studies like Ferri and Jones (1979), Cherry and Spradley (1989), results show a significant industry effect. The significant industry effect in gearing lends support for Bradley *et al.*, (1984), Bennett and Donnelly (1993), Mackay and Phillips (2002), and Fan *et al.*, (2003), among others. The study also confirms that gearing is significantly negatively related to business risk at both firm level and industry level. The results show significant evidence that business risk and production technology plays a significant role in industry gearing differences. Taken together, business risk and technology explain over 40 per cent of variations in gearing.

Differences in levels of gearing among industries appear to persist over a long time, supporting the findings of Bowen et al., (1982) but contradicting those of Ferri and Jones (1979) The persistence of industry gearing levels over time may be reflecting systematic industry differences in production techniques which in turn influences a firm's asset structure, cash flow stability and business risk.

In Tanzania with less than ten listed companies most of which have traded their shares for not more than four years, it may not be possible to collect sufficient data to carry out a similar research in the near future. However, this paper has carried out a comprehensive analysis which can be replicated in any developing country provided similar data is available. The low level of development of the capital markets would imply that managers of firms in less developed African countries may not have flexibility in making adjustments in their firm's capital structure compared to developed capital markets in the UK.

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APPENDICES

Table 1: *A Comparison Between This Study and Some Previous Cross-sectional Studies On Industry Influence in Capital Structure*

PANEL A: A SUMMARY OF SELECTED PREVIOUS STUDIES ON INDUSTRY INFLUENCE ON CAPITAL STRUCTURE VS. THIS STUDY

	BJK (1984)	BeDon (1993)	VL (1998)	THIS STUDY
Sample period	1962-1981	1977-1988	1967-1990	1985-2000
No.of Yrs	20YRS	12YRS	20YRS	16YRS
Sample size	851	433	112	570
No. of Industries	25	19	9	28
Methodology	OLS-regr.	OLS-regr	Ratio Analysis	OLS-regression
Strength	Broad test	Compr UK study	20yrs,P+NPtest	Lrg sample,
Weakness	R&D proxy	Growth, Profit proxies	Small sample	?

PANEL B: HYPOTHESISED AND ACTUAL RELATION BETWEEN FIRM ATTRIBUTES AND CAPITAL STRUCTURE

<u>ATTRIBUTES:</u>	BJK (1984)	BeDon (1993)	VL (1998)	THIS STUDY
INDUSTTRY INFLUENCE	Strong	Present	Weak	Strong

Key:

BJK (1984) = Bradley *et al* (1984)

BenDon (1993)= Benettand Donnelly (1993)

VL (1998) = Varela and Limmack (1998)

Table 2: *Descriptive statistics for industry influence analysis*

Variable	Mean	Std.Dev	Min	Qrt1	Median	Qrt3	Max	N
TL/TA-BV	0.51	0.15	0.10	0.41	0.51	0.59	0.97	566
TL/TA-MV	0.37	0.16	0.00	0.25	0.37	0.49	0.78	570
D/E-BV	0.22	0.22	0.00	0.05	0.16	0.33	0.98	545
D/E-MV	0.14	0.15	0.00	0.03	0.09	0.20	0.89	566
D/CAP-BV	0.18	0.16	0.00	0.05	0.15	0.26	0.99	566
LTD/TA-BV	0.03	0.04	0.00	0.002	0.02	0.049	0.28	566
STD/TA-BV	0.05	0.04	0.00	0.02	0.05	0.09	0.20	562
CL/TA-BV	0.39	0.14	0.07	0.30	0.39	0.48	0.89	570
EBITDA/I	9.9	8.4	0.56	4.5	7.1	12.5	49.7	505
SIGOITA	0.06	0.06	0.01	0.02	0.045	0.07	0.56	570
CVEBITDA	0.78	0.51	0.14	0.44	0.63	0.98	4.03	536
FA/TA	0.34	0.19	0.00	0.21	0.32	0.43	0.93	568

Table 3: *Correlation Matrix for Variables in Industry Influence Analysis*

	TL/TA-BV	TL/TA-MV	D/E-BV	D/E-MV	LTD/TA-BV	STD/TA-BV	CL/TA-BV	EBITDA/I	SIGOITA	FA/TA
TL/TA-MV	0.50									
D/E-BV	0.54	0.27								
D/E-MV	0.37	0.60	0.68							
LTD/TA-BV	0.14	0.14	0.38	0.39						
STD/TA-BV	0.32	0.12	0.71	0.49	0.25					
CL/TA-BV	0.80	0.44	0.06	0.00	-0.01	-0.08				
EBITDA/I	-0.34	-0.55	-0.34	-0.43	-0.15	-0.29	-0.13			
SIGOITA	0.01	-0.19	-0.10	-0.19	-0.14	-0.10	0.08	-0.06		
CVEBITDA	0.21	0.01	0.01	-0.07	-0.15	-0.00	0.25	-0.14	0.59	
FA/TA	-0.28	-0.07	0.09	0.17	0.10	0.18	-0.45	-0.06	-0.22	-0.15

Table 4: *UK Gearing Ratios as Per Comparable Studies*

Gearing measures	*This Study*			*BevDan (2002)*		*VL (1998)*		*RZ (1995)*	
	Mean	Median	N	Mean	N	Mean	N	Mean (Medians*)	N (UK)
TLP/TA-BV	0.51	0.51	702	0.49	822	-	112	0.48	522
TLP/TA-MV	0.38	0.37	702	-	822	-	112	-	522
Dp/TA-BV	0.10	0.08	702	0.18	822	-	112	0.13	522
Dp/TA-MV	0.08	0.06	702	-	822	-	112	-	522
Dp/E-BV	0.23	0.22	702	-	822	0.40	112	-	522
Dp/E-MV	0.17	0.10	702	-	822	-	112	-	522
Dp/CAP-BV	0.19	0.16	702	0.13	822	-	112	0.19	522
Dp/CAP-MV	0.12	0.09	702	-	822	-	112	-	522
LTD/TA-BV	0.04	0.02	702	-	822	-	112	-	522
STD/TA-BV	0.06	0.05	702	-	822	-	112	-	522
CL/TA-BV	0.39	0.38	702	0.40	822	-	112	-	522
EBIT/I	7.25	5.0	702	-	822	5.56	112	4.79*	522
EBITDA/I	9.2	7.1	702	-	822	-	112	6.4*	522

Key:

BevDan (2002)= Bevan and Danbolt (2002)

VL (1998)=Varela and Limmack (1998)

RZ (1995)= Rajan and Zingales (1995)

Table 5: *Industry and Intertemporal Range for 1985 to 2000*

	Overall		Industry range (Mean)		Intertemporal range (Mean)		
	Mean	Std.Dev	High	Low	High	Low	Low**
TL/TA-BV	0.51	0.15	0.65 (16)	0.37 (27)	0.66 (1999)	0.32 (1985)	0.47 (1989)
D/TA-BV	0.10	0.09	0.15 (8)	0.03 (4)	0.13 (2000)	0.05 (1985)	0.08 (1989)
D/E-BV	0.24	0.25	0.48 (20)	0.05 (4)	0.25 (1999)	0.10 (1985)	0.17 (1989)
D/E-MV	0.15	0.18	0.33 (16)	0.02 (11)	0.35 (1992)	0.09 (1987)	0.14 (1989)
D/CAP-BV	0.18	0.16	0.26 (20)	0.05 (4)	0.25 (1998)	0.09 (1986)	0.15 (1993)
LTD/TA-BV	0.04	0.06	0.09 (8)	0.005 (11)	0.05 (2000)	0.02 (1985)	0.04 (1997)
STD/TA-BV	0.06	0.05	0.10 (20)	0.02 (4)	0.08 (2000)	0.02 (1985)	0.04 (1989)
CL/TA-BV	0.39	0.14	0.61 (12)	0.24 (8)	0.76 (1995)	0.28 (1985)	0.38 (1989)
EBIT/I	7.25	6.56	11.8 (7)	3.15 (16)	6.24 (1997)	2.33 (1985)	3.1 (1992)
EBITDA/I	9.9	8.4	16.3 (12)	4.23 (16)	8.88 (1997)	3.37 (1985)	4.86 (1991)
MEDIANS:							
EBIT/I	5.06	-	-	-	-	-	-
EBITDA/I	7.01	-	-	-	-	-	-
OP.RISK (mean):							
SIGOITA	0.06	0.06	0.14 (11)	0.03 (18)	-	-	-
CVEBITDA	0.78	0.51	1.11 (11)	0.51 (14)	-	-	-

Where:

TL=Total liabilities (including preference shares)

D= Total debt (including preference shares)

LTD=Long term debt (including preference shares)

STD= Short term debt

TA=Total assets

BV= Book value

MV= Market value

EBIT/I= (Profit before Interest and tax)/Interest charge

EBITDA/I=(Profit before Interest, tax and Depreciation)/Interest charge

SIGOITA= Standard deviation of operating income over total assets for 1985-2000period

CVEBITDA= Coefficient of variation (C.V) of EBITDA for 1985-2000 period

Table 6.1: *ANOVA Results With Dummy Variables Coefficients for TL/TA-BV*

S/N	INDNUM	INDG	N	Mean	Std. Dev	Dummy var.coeff.	t-stat
27	95	Pharmaceuticals	12	0.37	0.19	-0.148	-2.49
18	67,68,72,114	Malt Beverages	24	0.38	0.15	-0.138	-2.69
24	87	Retail: Multidept.	13	0.40	0.13	-0.118	-2.02
8	31,50,51,97	Oil &Gas expl/prodn.	11	0.40	0.18	-0.111	-1.82
13	59,62	Household apps & house ware	11	0.44	0.16	-0.079	-1.29
4	120	Engineering Fabrication	14	0.44	0.11	-0.075	-1.30
14	60	Furniture +Floor covering	13	0.46	0.08	-0.052	-0.89
5	37,57	Electronics: Parts & Equipments	34	0.46	0.15	-0.052	-1.07
19	69,78	Apparel	30	0.47	0.13	-0.042	-0.85
9	33,92,93	Chemicals	15	0.48	0.06	-0.031	-0.55
25	94	Broadcasting	13	0.49	0.20	-0.03	-0.51
1	30,32	Construction materials	35	0.50	0.12	-0.019	-0.38
10	55	Leisure facilities	14	0.50	0.12	-0.012	-0.20
11	58	Software	12	0.51	0.16	*	*
23	66,90	Retail: Soft & Hard lines	28	0.51	0.15	-0.005	-0.11
7	40	Distribution: Other	13	0.51	0.16	-0.004	-0.07
28	132	Medical Equipment & Supplies	13	0.52	0.19	*	*
12	150,151	Computer & Internet services	14	0.52	0.17	0.00	0.00
3	74	Engineering: General	48	0.52	0.14	0.008	0.17
15	63	Motor vehicle: Parts	10	0.53	0.13	0.011	0.18
20	84	Publishing	25	0.53	0.12	0.019	0.37
17	71	Food Processors	27	0.54	0.12	0.029	0.57
21	86	Business Support	35	0.56	0.18	0.048	0.98
2	36,39,43	Construction	51	0.57	0.15	0.055	1.18
6	46	Distribution: Indus. components	19	0.58	0.16	0.065	1.19
22	83	Food & Drug Retailers	12	0.62	0.27	0.101	1.70
26	41	Media Agencies	10	0.65	0.17	0.130	2.08
16	64	Motor vehicle: Distribution	14	0.65	0.09	0.132	2.30
		TOTAL	570	0.51	0.16		
		R-SQRD/R-SQRD (adj.)				16%	12%
		F-STATISTIC				3.93	
		P-VALUE				0.000	

Software industry was removed because its mean was closest to the sample mean. In addition, Minitab, the statistical software used for regression removed 'medical equipment and supplies' industry from regression, because it was highly correlated to other industries.

Table 6.2: *ANOVA Results With Dummy Variables Coefficients for TL/TA-MV*

S/N	INDNUM	INDG	N	Mean	Std. Dev	Dummy var.coeff.	t-stat
27	95	Pharmaceuticals	12	0.14	0.11	-0.086	-1.57
11	58	Software	12	0.17	0.07	-0.056	-1.03
25	94	Broadcasting	13	0.18	0.11	-0.041	-0.77
28	132	Medical equipments and Supplies	13	0.22	0.12	*	*
12	150,151	Computer and Internet	14	0.27	.0.14	0.041	0.78
24	87	Retail: Multidept.	13	0.27	0.11	0.044	0.82
8	31,50,51,97	Oil & Gas expl/prodn	11	0.28	0.12	0.052	0.93
20	84	Publishing	25	0.30	0.13	0.071	1.51
13	59,62	Household apps &house ware	11	0.30	0.08	0.074	1.32
5	37,57	Electronics: Parts & Equipments	34	0.32	0.16	0.096	2.15
21	86	Business Support	35	0.33	0.15	0.100	2.26
9	33,92,93	Chemicals	15	0.33	0.05	0.102	1.97
23	66,90	Retail: Soft & Hard lines	28	0.36	0.14	0.102	2.91
10	55	Leisure facilities	14	0.36	0.15	0.135	2.57
18	67,68,72,114	Malt beverages	24	0.36	0.12	0.137	2.90
6	46	Distribution: Components	19	0.38	0.16	0.157	3.18
22	83	Food & Drug Retailers	12	0.38	0.15	0.159	2.91
14	60	Furniture + Floor covering	13	0.41	0.15	0.182	3.39
15	63	Motor vehicle: Parts	10	0.41	0.09	0.183	3.18
17	71	Food processors	27	0.42	0.10	0.191	4.14
4	120	Engineering: Fabrication	14	0.43	0.15	0.201	3.80
19	69,78	Apparel	30	0.43	0.14	0.204	4.49
1	30,32	Construction materials	35	0.43	0.14	0.225	5.93
26	41	Media Agencies	10	0.43	0.17	0.210	3.65
3	74	Engineering: General	48	0.44	0.14	0.215	5.04
7	40	Distribution: Other	13	0.46	0.13	0.235	4.38
2	36,39,43	Construction	51	0.51	0.17	0.285	6.70
16	64	Motor vehicle: Distribution	14	0.63	0.10	0.408	7.73
		TOTAL	570	0.37	0.16		
		R-SQRD/R-SQRD (adj.)				34.4%	31.1%
		F-STATISTIC				10.53	
		P-VALUE				0.000	

Minitab, the statistical software used for regression removed 'medical equipment and supplies' industry from regression, because it was highly correlated to other industries.

Table 6.3: *ANOVA Results With Dummy Variables Coefficients for STD/TA*

S/N	INDNUM	INDG	N	Mean	Std. Dev	Dummy var.coeff.	t-stat
4	120	Engineering Fabrication	14	0.02	0.02	-0.050	-2.54
24	87	Retail: Multidept.	13	0.03	0.03	-0.040	-1.99
19	69,78	Apparel	30	0.03	0.03	-0.039	-2.26
14	60	Furniture + Floor covering	13	0.03	0.02	-0.037	-1.82
12	150,151	Computer services & Internet	14	0.04	0.06	-0.035	-1.75
7	40	Distribution: Other	13	0.04	0.03	-0.034	-1.70
13	59,60	Household apps & House ware	11	0.04	0.06	-0.031	-1.48
27	95	Pharmaceuticals	12	0.04	0.04	-0.029	-1.43
5	37,57	Electronics: Parts & Equipments	34	0.04	0.04	-0.026	-1.58
2	36,39,43	Construction	51	0.05	0.04	-0.023	-1.43
25	94	Broadcasting	13	0.05	0.05	-0.022	-1.11
6	46	Distribution: Ind. Components	19	0.05	0.04	-0.022	-1.19
26	41	Media Agencies	10	0.05	0.05	-0.018	-0.84
11	58	Software	12	0.05	0.05	-0.017	-0.83
3	74	Engineering: General	48	0.06	0.05	-0.010	-0.61
23	66,90	Retail: Soft & Hard lines	28	0.06	0.05	-0.010	-0.56
1	30,32	Construction materials	34	0.06	0.05	-0.007	-0.40
8	31,50,51,97	Oil & Gas expl/prodn	11	0.07	0.04	-0.005	-0.22
16	64	Motor vehicle: Distribution	14	0.07	0.05	-0.001	0.00
28	132	Medical Equipment & Supplies	13	0.07	0.06	*	*
21	86	Business support	35	0.07	0.07	0.003	0.19
18	67,68,72,114	Malt Beverages	24	0.08	0.05	0.005	0.29
22	83	Food & Drug Retailers	12	0.08	0.08	0.007	0.35
10	55	Leisure Facilities	14	0.08	0.06	0.008	0.42
17	71	Food Processors	27	0.08	.05	0.013	0.73
9	33,92,93	Chemicals	15	0.09	.03	0.014	0.74
15	63	Motor vehicles: Parts	10	0.09	0.08	0.018	0.84
20	84	Publishing	25	0.10	0.08	0.028	1.56
		TOTAL	570	0.06	0.05		
		R-SQRD/R-SQRD (adj.)				12.5%	8.1%
		FSTATISTIC				2.86	
		P-VALUE				0.000	

Minitab, the statistical software used for regression removed 'medical equipment and supplies' industry from regression, because it was highly correlated to other industries.

Table 6.4: *ANOVA results with dummy variables coefficients for EBITDA/I*

S/N	*INDNUM*	*INDG*	*N*	*Mean*	*Std. Dev*	*Dummy var.coeff.*	*t-stat*
16	64	Motor vehicle: Distribution	14	4.23	1.94	-8.710	-2.49
10	55	Leisure Facilities	14	4.97	3.59	-7.977	-2.07
7	40	Distribution: Other	13	7.07	8.41	-5.875	-1.56
18	67,68,72,114	Malt Beverages	24	7.33	5.46	-5.610	-1.72
3	74	Engineering: General	48	7.77	7.07	-5.177	-1.73
17	71	Food Processors	27	7.89	4.33	-5.052	-1.60
1	30,32	Construction Materials	35	8.24	4.98	-4.700	-1.52
2	36,39,43	Construction	51	8.48	7.77	-4.459	-1.50
8	31,50,51,97	Oil & Gas expl/prodn	11	8.88	6.11	-4.061	-1.10
22	83	Food & Drug Retailers	12	9.02	4.23	-3.922	-1.04
23	66,90	Retail: Soft & Hard lines	28	9.35	9.16	-3.590	-1.13
9	33,92,93	Chemicals	15	9.37	3.68	-3.573	-1.03
20	84	Publishing	25	9.66	8.79	-3.278	-1.00
19	69,78	Apparel	30	9.8	8.76	-3.144	-1.01
15	63	Motor vehicle: Parts	10	10.27	5.92	-2.672	-0.71
26	41	Media Agencies	10	10.59	9.35	-2.353	-0.61
21	86	Business Support	35	10.97	8.59	-1.970	-0.64
5	37,57	Electronics: Parts and Equipments	34	12.22	9.46	-0.723	-0.23
11	58	Software	12	12.69	8.56	-0.255	-0.07
6	46	Distribution: Ind. Components	19	12.90	12.19	-0.045	-0.01
28	132	Medical Equipments & Supplies	13	12.94	7.98	*	*
24	87	Retail: Multidept.	13	13.07	7.15	0.128	0.03
27	95	Pharmaceuticals	12	13.32	6.82	0.382	0.08
14	60	Furniture + Floor covering	13	13.58	8.44	0.638	0.17
4	120	Engineering Fabrication	14	13.69	12.76	0.749	0.21
25	94	Broadcasting	13	15.46	10.88	2.515	0.68
13	59,62	Household apps & House ware	11	16.28	16.61	3.339	0.89
12	150,151	Computer services & Internet	14	16.33	11.84	3.388	0.95
		TOTAL	570	9.96	8.42		
		R-SQRD/R-SQRD (adj.)				10.3%	5.3%
		F-STATISTIC				2.04	
		P-VALUE				0.000	

Minitab, the statistical software used for regression removed 'medical equipment and supplies' industry from regression, because it was highly correlated to other industries.

Table 6.5: *ANOVA results with dummy variables for SIGOITA*

S/N	INDNUM	INDG	N	Mean	Std. Dev	Dummy var.coeff.	t-stat
18	67,68,72,114	Malt Beverages	24	0.03	0.02	-0.06	-3.08
24	87	Retail: Multidept.	13	0.03	0.01	-0.06	-2.70
9	33,92,93	Chemicals	15	0.03	0.02	-0.06	-2.57
15	63	Motor vehicle: Parts	10	0.04	0.02	-0.05	-2.11
3	74	Engineering: General	48	0.04	0.02	-0.04	-2.44
16	64	Motor vehicle: Distribution	14	0.04	0.03	-0.04	-1.98
1	30,32	Construction Materials	25	0.05	0.03	-0.04	-2.24
22	83	Food & Drug Retailers	12	0.05	0.05	-0.04	-1.72
17	71	Food Processors	27	0.05	0.07	-0.04	-1.94
4	120	Engineering Fabrication	14	0.05	0.03	-0.04	-1.65
2	36,39,43	Construction	51	0.05	0.03	-0.03	-1.94
14	60	Furniture + floor covering	13	0.05	0.02	-0.03	-1.53
19	69,78	Apparel	30	0.05	0.02	-0.03	-1.77
5	37,57	Electronics: Parts & Components	34	0.06	0.04	-0.03	-1.60
13	59,62	Household apps. & House ware	11	0.06	0.03	-0.03	-1.20
6	46	Distribution: Ind. Components	19	0.06	0.04	-0.02	-1.17
8	31,50,51,97	Oil & Gas expl/prodn	11	0.07	0.05	-0.02	-0.88
23	69,90	Retail: Soft & Hard lines	28	0.07	0.05	0.02	-0.91
7	40	Distribution: Other	13	0.08	0.08	-0.01	-0.55
10	55	Leisure Facilities	14	0.08	0.06	-0.01	-0.51
25	94	Broadcasting	13	0.08	0.03	-0.01	-0.35
21	86	Business Support	35	0.09	0.10	0.00	-0.14
20	84	Publishing	25	0.09	0.11	0.00	0.00
28	132	Medical Equipment & Supplies	13	0.09	0.10	*	*
26	41	Media Agencies	10	0.09	0.09	0.01	0.21
27	95	Pharmaceuticals	12	0.10	0.10	0.01	0.64
12	150,151	Computer services & internet	14	0.11	0.08	0.02	1.08
11	58	Software	12	0.14	0.11	0.05	2.22
		TOTAL	570	0.06	0.06		
		R-SQRD/R-SQRD (adj.)				14.4%	10.1%
		F-STATISTIC				3.36	
		P-VALUE				0.000	

Minitab, the statistical software used for regression removed 'medical equipment and supplies' industry from regression, because it was highly correlated to other industries.

Table 7: *Results of Non-Parametric Tests on Gearing Industry Rankings*

GEARING MEASURE	KRUSKAL-WALLIS (H) TEST	CRITICAL CHI-SQUARE VALUE χ^2 AT .01 LEVEL (D.F =27)
BOOK VALUE GEARING MEASURES		
TLp/TA-BV	89.46	46.96
Dp/TA-BV	83.17	46.96
Dp/E-BV	80.78	46.96
Dp/CAP	75.54	46.96
LTDP/TA-BV	64.38	46.96
STD/TA-BV	75.6	46.96
CL/TA-BV	121.14	46.96
EBITDA/I	64.43	46.96
MARKET VALUE GEARING MEASURES		
TLp/TA-MV	187.29	46.96
Dp/E-MV	118.01	46.96
Dp/CAP-MV	118.01	46.96
OPERATING RISK PROXIES		
SIGOITA	117.56	46.96
CVEBITA	78.49	46.96
PRODN. TECHNOLOGY PROXY		
FAn/TAn	212.98	46.96

The test statistic (H) in each case is greater than 46.9630, the null hypothesis that the industry medians are all equal is rejected.

Table 8.1: *Firm-level business risk regression coefficients*

	GEARING	SIGOITA	OBS.	R-sq (adj.)	F-STATISTIC
1	TLp/TA-BV	0.04 (0.41)	566	0	0.17
2	Dp/E-BV	-0.37 (-2.4)*	545	0.9	6.09
3	LTD/TA-BV	-0.019 (-2.7)*	362	1.8	7.7
4	STD/TA-BV	-0.08 (-2.5)*	562	0.9	6.27
5	CL/TA-BV	0.19 (2.1)[a]	570	0.6	4.42
6	EBITDA/I	-10.8 (-1.5)	505	0.3	2.32
7	TLp/TA-MV	-0.53 (-4.7)*	570	3.7	22.9
8	Dp/E-MV	-0.47 (-4.6)*	566	3.4	21.1

Coefficients that are significantly different from zero at 1%, 5% and 10% are marked with *, *a*, and *b* respectively. The numbers in the parentheses in column 3 are corresponding t-statistics.

Table 8.2: *The Combined Influence of Business Risk and Technology on Firm Gearing*

	GEARING	*SIGOITA*	*FAn/TAn*	*OBS.*	*R-sq (adj.)*	*F-STATISTIC*
1	TLp/TA-BV	-0.10 (-0.98)	-.023 (-7.1)*	565	8.1	25.7
2	Dp/E-BV	-0.31 (-2.01)*	0.09 (1.8) b	544	1.3	4.63
3	LTD/TA-BV	-0.017 (-2.4) a	0.004 (1.6)	361	2.2	5.05
4	STD/TA-BV	-0.05 (-1.6)	0.04 (3.8)*	561	3.3	10.4
5	CL/TA-BV	-0.012 (-0.14)	-0.32 (-11.8)*	568	20.2	72.9
6	EBITDA/I	-13.5 (-1.8) b	-3.5 (-1.8) b	504	0.7	2.66
7	TLp/TA-MV	-0.6 (-5.3)*	-0.11 (-2.9)*	568	5.0	15.8
8	Dp/E-MV	-0.39 (-3.7)*	0.11 (3.3)*	564	5.1	16.2

Coefficients that are significantly different from zero at 1%, 5% and 10% are marked with *, *a*, and *b* respectively. The numbers in the parentheses in columns 3 and 4 are corresponding t-statistics.

Table 8.3: *Industry Level Business Risk Regression Coefficients*

	GEARING	*SIGOITA*	*OBS.*	*R-sq (adj.)*	*F-STATISTIC*
1	TLp/TA-BV	0.40 (0.81)	28	0	0.66
2	Dp/E-BV	-0.65 (-1.09)	28	0.7	1.19
3	LTD/TA-BV	-0.05 (-2.2) a	28	13.4	5.17
4	STD/TA-BV	-0.08 (-0.64)	28	0	0.41
5	CL/TA-BV	0.52 (0.94)	28	0	0.89
6	EBITDA/I	43.2 (1.98) b	28	9.8	3.94
7	TLp/TA-MV	-2.2 (-3.33)*	28	27.2	11.08
8	Dp/E-MV	-1.46 (-3.3)*	28	27.3	11.1

Coefficients that are significantly different from zero at 1%, 5% and 10% are marked with *, *a*, and *b* and respectively. The numbers in the parentheses in columns 3 are corresponding t-statistics.

Table 8.4: *The-combined Influence of Business Risk And Technology on Industry Gearing*

	GEARING	*SIGOITA*	*FAn/TAn*	*OBS.*	*R-sq (adj.)*	*F-STATISTIC*
1	TLp/TA-BV	-0.13 (-0.27)	-0.26 (-2.58) [a]	28	16.8	3.73
2	Dp/E-BV	-0.38 (-0.58)	0.13 (0.97)	28	0.5	1.07
3	LTD/TA-BV	-0.05 (-1.98) [b]	0.001 (0.12)	28	10	2.5
4	STD/TA-BV	0.04 (0.27)	0.05 (2.14) [a]	28	10.1	2.5
5	CL/TA-BV	-0.28 (-0.58)	-0.4 (-3.94)*	28	35.5	8.4
6	EBITDA/I	32.6 (1.36)	-5.2 (-1.06)	28	10.2	5.54
7	TLp/TA-MV	-2.9 (-4.5)*	-0.37 (-2.8)*	28	42.4	10.9
8	Dp/E-MV	-1.39 (-2.8)*	0.03 (0.3)	28	24.7	5.4

Coefficients that are significantly different from zero at 1%, 5% and 10% are marked with *, *a*, *b* and respectively. The numbers in the parentheses in columns 3 and 4 are corresponding t-statistics.

Table 9.1: *Persistency: Industry rankings from 1990 to 2000 using TLP/TA-BV*

ndustries		N	$\overline{X}$	Mean gearing rankings for each year from 1990 to 2000											Overall ranking	
INDNUM	INDG			90	91	92	93	94	95	96	97	98	99	00	Rank	SIG
64	M/v: Distribn	14	.65	9	5	6	6	2	1	1	1	3	4	3	1	23
41	Med. agencies	10	.65	1	1	1	1	3	2	2	10	2	3	1	2	4
83	F&DRetailers	12	.62	2	3	5	2	4	6	8	5	5	5	2	3	21
46	Dist.Ind.comp	19	.57	5	16	12	14	11	10	9	2	8	8	4	4	13
36,39,43	Construction	51	.57	6	6	4	3	8	8	7	4	9	11	6	5	18
86	Bus. Support	35	.56	12	8	14	8	12	5	6	8	6	9	5	6	7
71	Food process	27	.54	17	12	10	10	5	4	5	9	7	12	8	7	20
84	Publishing	25	.53	14	4	3	9	10	11	10	6	11	6	7	8	6
63	M/v: Parts	10	.53	8	13	17	16	15	15	14	18	14	18	15	9	25
74	Engin.: Gen	48	.53	10	15	15	11	13	16	15	14	18	14	9	10	24
150,151	Computer	14	.52	18	11	11	15	7	17	11	7	10	16	11	11	2
132	Medical Equi	13	.52	13	22	7	4	6	7	4	3	1	13	27	12	5
40	Distr.other	13	.51	11	10	24	20	16	12	12	11	19	22	21	13	10
66,90	Retail: S&H	28	.51	7	9	8	12	14	14	13	12	16	19	16	14	11
58	Software	12	.51	4	7	13	7	18	18	18	15	15	7	19	15	1
55	Leisure Facili	14	.50	3	2	2	5	1	3	3	13	26	23	20	16	9
30,32	Constr. mater	35	.50	16	14	9	13	9	13	16	16	17	1	22	17	22
94	Broadcasting	13	.49	25	25	25	25	21	21	19	17	4	10	10	18	8
33,92,93	Chemicals	15	.48	19	20	20	19	22	24	22	20	13	15	17	19	26
69,78	Apparel	30	.47	22	21	22	18	19	20	20	19	12	2	12	20	16
37,57	Electron.P&E	34	.46	21	18	18	22	24	22	21	23	20	20	14	21	15
60	Furnitre&floo	13	.46	15	19	19	21	23	25	23	24	22	24	25	22	17
120	Engin. Fabric	14	.45	20	23	21	17	20	19	17	21	21	21	23	23	19
59,62	Households	11	.44	23	24	23	24	17	23	25	22	25	28	24	24	14
50,51,97	Oil &Gas	11	.40	24	17	16	23	27	26	24	25	24	27	28	25	12
87	Retail: Multi	13	.40	26	27	28	28	26	27	27	26	28	26	26	26	27
67,68,72	Malt Bevges	24	.38	27	26	27	27	28	28	26	27	27	25	18	27	28
95	Pharmaceutic	12	.37	28	28	26	26	25	9	28	28	23	17	13	28	3

Explanation: Names of industries are given in full in table 7.1.9; space does not allow some full names in this table. However, identification is possible. The aim of this table is to show the mean gearing ratio rankings for each year from 1990 to 2000, as well as the mean for the entire sample period (1985-2000), and relating these to the level of business risk as measured by the ratio of standard deviation of operating income divided by total assets (SIGOITA), for the entire sample period. S/N is the industry serial number given to a particular industry in table 7.1.9, INDNUM refers to Data Stream industry number, and INDG is the DataStream industry group name. $\overline{X}$, denotes the cross-sectional mean gearing ratio for 16-years from 1985 to 2000, the mean is presented in descending order. Under 'overall ranking', 'rank' gives the position of a particular industry according to its cross-sectional mean for the 16-years, starting with the highest geared industry to the lowest geared, and 'SIG' denotes the corresponding ranking for the measure of business risk, SIGOITA.

Interpretation: Industry rankings exhibit persistency for the 1990-2000 period. There is also evidence that business risk is negatively related to gearing, as some of the highly geared industries like both motor vehicle industries, food & drug retailers, and food processors, are also the least risky industries. On the other hand, the least geared industry, pharmaceuticals, is one of the risky industries, as it ranks third.

Table 9.2: *Persistency: Industry Rankings from 1990 to 2000 using Dp/TA-BV*

Industries		N	$\overline{X}$	Mean gearing rankings for each year from 1990 to 2000											Overall ranking	
INDNUM	INDG			90	91	92	93	94	95	96	97	98	99	00	Rank	SIG
50,51,97	Oil & Gas	11	.15	1	1	1	1	1	1	2	5	3	3	10	1	12
84	Publishing	25	.15	4	3	2	8	12	10	5	1	8	2	1	2	6
33,92,93	Chemicals	15	.14	8	9	9	5	7	13	8	3	1	1	3	3	26
55	Leisure Facili	14	.13	2	4	6	4	4	4	9	10	16	16	9	4	9
63	M/v: Parts	10	.13	11	8	6	10	13	9	10	14	7	6	4	5	25
71	Food process	27	.12	12	13	10	11	3	3	1	8	4	9	8	6	20
67,68,72	Malt Bevges	25	.12	15	16	14	13	8	8	4	4	6	8	2	7	28
83	F&DRetailers	12	.12	3	5	4	15	10	14	13	6	5	4	6	8	21
30,32	Constr. mater	35	.11	7	6	3	2	6	5	3	7	11	13	15	9	22
74	Engin.: Gen	48	.11	5	11	12	17	17	12	14	13	10	5	7	10	24
66,90	Retail: S&H	28	.11	6	2	8	3	2	6	7	9	14	14	14	11	11
132	Medical Equi	13	.11	18	18	15	14	16	16	11	2	2	11	16	12	5
86	Bus. Support	35	.10	16	19	21	23	18	18	16	17	12	12	12	13	7
64	M/v: distrbn	14	.10	13	10	11	6	9	7	6	11	15	18	13	14	23
46	Dist Ind.comp	19	.10	23	25	26	25	25	26	23	12	9	7	5	15	13
36,39,43	Construction	51	.08	14	14	19	12	14	11	12	15	19	20	19	16	18
37,57	Electron.P&E	34	.08	19	22	20	18	15	15	15	19	17	15	11	17	15
94	Broadcasting	13	.08	22	26	23	26	22	23	19	25	13	10	18	18	8
41	Med.agencies	10	.07	10	12	7	16	23	25	24	23	27	19	26	19	4
40	Distr.other	13	.07	17	20	22	21	24	24	25	21	24	22	22	20	10
60	Furnitre&floo	13	.07	9	7	5	19	20	19	22	22	25	25	27	21	17
59,62	Households	11	.06	21	21	17	20	26	21	26	18	18	21	20	22	14
58	Software	12	.06	28	23	27	28	28	27	28	26	22	17	17	23	1
95	Pharmaceutic	12	.06	25	17	18	9	5	2	21	27	21	24	21	24	3
69,78	Apparel	30	.06	24	27	24	27	21	22	17	20	23	23	24	25	16
87	Retail: Multi	13	.05	26	24	25	22	19	20	20	24	26	26	23	26	27
150,151	Computer	14	.05	20	15	13	7	11	17	18	16	20	27	25	27	2
120	Engin. Fabric	14	.03	27	28	28	24	27	28	27	28	28	28	28	28	19

Explanation: Names of industries are given in full in table 7.1.9; space does not allow some full names in this table. However, identification is possible. The aim of this table is to show the mean gearing ratio rankings for each year from 1990 to 2000, as well as the mean for the entire sample period (1985-2000), and relating these to the level of business risk as measured by the ratio of standard deviation of operating income divided by total assets (SIGOITA), for the entire sample period. S/N is the industry serial number given to a particular industry in table 7.1.9, INDNUM refers to Data Stream industry number, and INDG is the Data Stream industry group name. $\overline{X}$, denotes the cross-sectional mean gearing ratio for 16-years from 1985 to 2000, the mean is presented in descending order. Under 'overall ranking', 'rank' gives the position of a particular industry according to its cross-sectional mean for the 16-years, starting with the highest geared industry to the lowest geared, and 'SIG' denotes the corresponding ranking for the measure of business risk, SIGOITA.

Interpretation: Generally most industry rankings show persistency for the whole of the 1990-2000 period. The inverse relation between industry gearing ratios and the level of business risk is also evident as highly geared industries like chemicals, motor vehicle parts, and malt beverages are actually the least risky three industries in the sample. On the other hand, the less geared industries like computer services & internet, pharmaceuticals, and Software, are actually the first three industries with the highest level of business risk.

Table 9.3: *Persistency: Industry Rankings from 1990 to 2000 using Dp/E-MV*

Industries		*N*	$\overline{X}$	*Mean gearing rankings for each year from 1990 to 2000*											*Overall ranking*	
INDNUM	INDG			90	91	92	93	94	95	96	97	98	99	00	Rank	SIG
64	M/v: distrbn	14	.33	3	5	6	6	2	2	1	1	1	1	1	1	23
67,68,72	Malt Bevges	25	.22	18	12	13	10	9	9	5	3	6	4	2	2	28
36,39,43	Construction	51	.21	2	3	4	3	5	5	3	5	9	9	11	3	18
50,51,97	Oil & Gas	11	.20	7	2	2	1	1	1	6	9	16	7	17	4	12
30,32	Constr. mater	35	.20	8	1	1	5	8	8	4	2	4	11	14	5	22
74	Engin.: Gen	48	.19	11	8	9	11	12	12	12	11	7	3	3	6	24
71	Food proces	27	.19	12	10	3	8	4	4	2	4	11	8	7	7	20
55	Leisure Facili	14	.19	1	6	7	4	6	6	9	12	13	13	8	8	9
63	M/v: Parts	10	.17	6	4	12	12	16	16	11	16	3	5	6	9	25
84	Publishing	25	.16	14	13	5	17	18	18	15	14	18	15	15	10	6
66,90	Retail: S&H	28	.16	9	9	8	6	10	10	10	10	12	14	13	11	11
33,92,93	Chemicals	15	.15	13	16	17	14	14	14	8	7	2	2	4	12	26
60	Furnitre&floo	13	.13	10	11	10	15	7	7	14	13	14	17	19	13	17
40	Distr.other	13	.12	4	7	11	13	20	20	16	18	21	16	22	14	10
37,57	Electron.P&E	34	.12	16	19	16	19	21	21	18	20	20	20	16	15	15
86	Bus. Support	35	.12	15	15	18	23	13	13	17	19	15	18	10	16	7
41	Med.agencies	10	.12	5	18	27	2	3	3	22	24	24	19	25	17	4
69,78	Apparel	30	.11	21	22	22	21	22	22	7	8	8	12	12	18	16
46	Dist Ind.comp	19	.11	19	14	15	20	15	15	19	6	5	10	9	19	13
83	F&DRetailers	12	.11	17	24	19	18	19	19	13	15	10	6	5	20	21
120	Engin. Fabric	14	.07	23	25	14	7	25	25	25	25	23	22	23	21	19
59,62	Households	11	.06	26	26	20	22	27	27	27	21	17	21	18	22	14
87	Retail: Multi	13	.06	22	21	23	24	11	11	20	22	26	24	20	23	27
132	Medical Equi	13	.06	27	20	25	25	24	24	21	17	19	23	24	24	5
150,151	Computer	14	.04	25	17	26	16	23	23	24	23	28	27	27	25	2
94	Broadcasting	13	.04	20	27	21	26	26	26	23	26	25	25	28	26	8
95	Pharmaceutic	12	.03	28	23	28	27	17	17	26	27	22	26	26	27	3
58	Software	12	.02	24	28	24	28	28	28	28	28	27	28	21	28	1

Explanation: Names of industries are given in full in table 7.1.9; space does not allow some full names in this table. However, identification is possible. The aim of this table is to show the mean gearing ratio rankings for each year from 1990 to 2000, as well as the mean for the entire sample period (1985-2000), and relating these to the level of business risk as measured by the ratio of standard deviation of operating income divided by total assets (SIGOITA), for the entire sample period. S/N is the industry serial number given to a particular industry in table 7.1.9, INDNUM refers to Data Stream industry number, and INDG is the DataStream industry group name. $\overline{X}$, denotes the cross-sectional mean gearing ratio for 16-years from 1985 to 2000, the mean is presented in descending order. Under 'overall ranking', 'rank' gives the position of a particular industry according to its cross-sectional mean for the 16-years, starting with the highest geared industry to the lowest geared, and 'SIG' denotes the corresponding ranking for the measure of business risk, SIGOITA.

Interpretation: Though the order of rankings changes form one measure of gearing to another, but most of the highly geared industries are still highly geared, and the rankings are persistent over the years. Gearing is inversely related to business risk as the highly geared industries also exhibit low levels of risk. Examples are, motor vehicle industries, malt beverages, and engineering: general. The least geared industries with highest levels of business risk are software, pharmaceuticals, computer & internet, and medical equipments & supplies.

Table 9.4: *Persistency: Industry rankings from 1990 to 2000 using STD/TA-BV*

dustries		N	$\overline{X}$	Mean gearing rankings for each year from 1990 to 2000											Overall ranking	
INDNUM	INDG			90	91	92	93	94	95	96	97	98	99	00	Rank	SIG
84	Publishing	25	.10	6	1	5	11	14	13	15	3	7	2	6	1.	6
63	M/v: Parts	10	.09	7	2	12	2	4	5	1	9	19	15	1	2	25
33,92,93	Chemicals	15	.09	5	4	6	5	10	18	3	2	1	1	5	3	26
71	Food process	27	.08	11	13	9	10	1	2	2	4	2	3	3	4	20
55	Leisure Facili	14	.08	1	3	1	19	19	4	6	8	14	14	13	5	9
83	F&DRetailers	12	.08	21	15	3	12	15	22	14	13	4	4	2	6	21
67,68,72	Malt Bevges	25	.08	15	12	11	9	3	6	5	1	5	7	4	7	28
86	Bus. Support	35	.07	9	11	16	14	12	16	13	10	3	8	9	8	7
132	Medical Equi.	13	.07	14	17	14	16	8	9	18	14	10	10	14	9	5
64	M/v: distrbn.	14	.07	13	9	8	6	2	3	4	5	9	16	7	10	23
50,51,97	Oil & Gas	11	.07	12	20	4	8	7	1	9	21	8	11	11	11	12
30,32	Constr. mater.	35	.06	2	5	7	4	6	7	7	6	6	12	20	12	22
66,90	Retail: S&H	28	.06	17	8	10	7	9	10	12	11	15	17	17	13	11
74	Engin.: Gen	48	.06	4	14	15	13	18	15	11	16	11	5	8	14	24
58	Software	12	.05	25	18	21	22	26	14	26	19	12	6	10	15	1
41	Med agencies	10	.05	3	6	2	1	5	17	23	24	28	19	26	16	4
46	Dist Ind comp	19	.05	20	22	24	21	22	24	22	12	17	18	12	17	13
94	Broadcasting	13	.05	23	26	25	27	27	25	20	27	23	9	15	18	8
36,39,43	Construction	51	.05	10	16	13	3	13	8	8	15	20	20	23	19	8
37,57	Electron.P&E	34	.04	19	21	20	15	11	12	10	18	18	13	16	20	15
95	Pharmaceutic	12	.04	18	28	19	18	16	20	17	25	16	22	19	21	3
59,62	Households	11	.04	16	10	18	25	28	26	21	7	13	28	18	22	14
40	Distr.other	13	.04	22	19	23	20	21	19	25	22	25	27	25	23	10
150,151	Computer	14	.04	27	23	27	24	25	27	27	20	24	21	21	24	2
60.	Furnitre&floo	13	.03	8	7	17	17	17	21	24	26	22	25	27	25	17
69,78	Apparel	30	.03	24	24	22	26	23	23	19	17	21	26	24	26	16
87	Retail: Multi	13	.03	28	27	28	28	20	11	16	23	27	23	22	27	27
120	Engin. Fabric	14	.02	26	25	26	26	23	28	28	28	26	24	28	28	19

Explanation: Names of industries are given in full in table 7.1.9; space does not allow some full names in this table. However, identification is possible. The aim of this table is to show the mean gearing ratio rankings for each year from 1990 to 2000, as well as the mean for the entire sample period (1985-2000), and relating these to the level of business risk as measured by the ratio of standard deviation of operating income divided by total assets (SIGOITA), for the entire sample period. S/N is the industry serial number given to a particular industry in table 7.1.9, INDNUM refers to DataStream industry number, and INDG is the DataStream industry group name. $\overline{X}$, denotes the cross-sectional mean gearing ratio for 16-years from 1985 to 2000, the mean is presented in descending order. Under 'overall ranking', 'rank' gives the position of a particular industry according to its cross-sectional mean for the 16-years, starting with the highest geared industry to the lowest geared, and 'SIG' denotes the corresponding ranking for the measure of business risk, SIGOITA.

Table 10: *Sample Industries*

S/N	*INDNUM*	*INDG*	*N*
1	30,32	Construction materials	35
2	36,39,43	Construction	51
3	74	Engineering: General	48
4	120	Engineering: Fabrication	14
5	37,57	Electronics: Parts & Equipments	34
6	46	Distribution: Industrial Components	19
7	40	Distribution: Other	13
8	31,50,51,97	Oil & Gas Exploration and Production	11
9	33,92,93	Chemicals	15
10	55	Leisure Facilities	14
11	58	Software	12
12	150,151	Computer services & internet	14
13	59,62	Household appliances & House ware	11
14	60	Furniture & Floor covering	13
15	63	Motor vehicles: Parts	10
16	64	Motor vehicles: Distribution	14
17	71	Food processors	27
18	67,68,72,114	Malt Beverages	24
19	69,78	Apparel	30
20	84	Publishing	25
21	86	Business Support	35
22	83	Food & Drug Retailers	12
23	66,90	Retail: Soft & Hard lines	28
24	87	Retail: Multi-departments	13
25	94	Broadcasting	13
26	41	Media Agencies	10
27	95	Pharmaceuticals	12
28	132	Medical Equipments & Supplies	13
		TOTAL	570