RIETI Discussion Paper Series 01-E-004

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Evidence from selected Japanese firms in the electrical machinery industry

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RIETI Discussion Paper Series 01-E-004
December 2001

Bank relationships and firm performance: Evidence from selected Japanese firms in the electrical machinery industry

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Abstract:

By using a sample of selected Japanese companies in the electrical machinery industry, we examine bank relationships and firm performance. We find weak evidence that firms with stronger ties with banks might have had higher profitability in the late 1970s. This relationship was more significant among firms that had no access to the public bond market or that were not affiliated with six large corporate groups. These firms with strong bank relationships, however, clearly did worse in the late 1990s. We also find that "monitoring benefits" seem to have disappeared by the late 1990s, since firms with higher growth potential (presumably a feature calling for close bank monitoring), tended to have lower bank dependence in recent years. These various changes in the influence of banking relationships may be associated with the maturity of these relationships, the financial liberalisation of the 1980s and the bust of the bubble economy in the early 1990s. We also find that firms whose main bank was weakly capitalised did worse in the late 1990s.

Key words: Corporate groups; Main bank; Relationship financing

JEL classification: G21, G32

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Chapter 3

Bank relationships and firm performance: Evidence from selected Japanese firms in the electrical machinery industry

3.1 Introduction

Chapter 1 has looked at the firm's choice between relationship and arm's length financing. It concluded that there were both benefits and costs to these two forms of raising funds and that the firm's choice between them depended on both borrower-specific and economy-wide factors. The purpose of the present chapter is to examine this choice for Japanese manufacturing firms and its influence on their performance over the past few decades.

The relative importance of relationship financing can be approximately measured by the ratio of bank debt to total debt (the choice between private debt (e.g. bank loans) and public debt (e.g. corporate bond issues)), since the private debt of Japanese manufacturing firms are more likely to be have been placed through relationship lending. When we look at the structure of bank debt in detail, we find, however, that

the strength of relationship financing can vary even among firms with the same bank dependency ratio. For example, the tendency of relationship financing might be stronger in a firm with a sole lender than in a firm with many comparable lenders. Thus, we have to examine the intensity of relationships with different lenders.

The rest of this chapter consists of the following three sections. Section 3.2 describes our sample firms and their characteristics. Section 3.3 studies the choice between two financing patterns, namely, privately-traded debt (i.e. bank loans) vs. publicly-traded debt and investigates its relationship with firm characteristics. In particular, we focus on “monitoring benefits” and its relation to the choice of bank debt.

Section 3.4 examines the effect of bank relationships on firm performance (i.e. interest payments and profitability), stressing the role of the main bank or other dominant lenders. As we have seen, there are costs and benefits from close bank relationships for firms and their effect on firm performance is theoretically ambiguous. Effects will vary depending on borrower-specific characteristics as well as on external (macroeconomic) conditions which bank clients are facing. In this sense, the relevance of banking relationships, including the main bank system in Japan, may vary across time, and,

thus, should be an empirical matter. The existing research on Japanese banking relationships has focused exclusively on the role of main banks and their impact on firm-level investment (e.g. Hoshi et al. (1991), Gibson (1996)). We are more interested in the overall performance of borrowers and examine not only main bank relations but also multiple ones. Finally, Section 3.5 sums up and concludes.

3.2 Data

3.2.1 Description of the data

We use a sample of manufacturing companies in the electrical machinery industry, which is obtained from the Nikkei NEEDS Company Data Base. The choice of our sample is dictated by the following criteria.

First, we select the electrical machinery industry, since together with the car sector, this has been a “leading industry” during the 1970s and 1980s, a symbol of the high growth and international competitiveness of the Japanese economy. Thus, it is in particular interesting to know whether its remarkable performance was associated

with close banking relationships or not.

Second, we choose 81 firms among the 209 listed in FY1998. Our selection criteria is to choose those (1) that have been listed at the latest since 1970, (2) with no change in their accounting period since 1970, (3) with no mergers since 1970 (excluding those whose assets increased by 100 per cent or decreased by 50 per cent from one year to the next), and (4) with no missing data. We then exclude firms with no bank loans. As a result, our sample includes 79 firms in 1978 and 71 in 1995.

Third, we select two sample periods, from March 1978 to March 1980 and from March 1995 to March 1998, since the comparison of the results between these two periods enables us to consider the influence of financial liberalisation in the 1980s, which made corporate fund-raising in both domestic and foreign capital markets much easier. The revision of the Foreign Exchange Control Law allowed Japanese firms to issue unsecured foreign bonds in the late 1980s and the gradual relaxation of the Bond Issuance Criterion during the 1980s also promoted their access to domestic public bond markets. To control for other factors, it is noted that the two periods roughly

correspond to expansionary phases of business cycles[1].

Table 3.1 reports the sample statistics. The firms are typically large with assets averaging 359 billion yen in the late 1990s, but the median is at 57 billion yen, indicating a positively skewed distribution.

3.2.2 The intensity of banking relationships: Seen from the perspective of lending concentration

Next, we obtain data on the size of loans from each lender, which are provided by "Kigyou Keiretsu Soran", Toyo-Keizai[2]. By using this information, we calculate several indicators measuring the concentration of lenders, a proxy for the intensity of banking relationships.

[1] The later sample period (four years) is longer than the earlier one (three years), since we exclude cases with no bank debt. There were more of these in the later period and since we need a comparable number of observations in both periods, we had to extend the latter's length.
[2] The data is available from March 1972.

Table 3.1 Descriptive statistics on firm characteristics

(1)

March 1978 - March 1980	Mean	Median	Std. Deviation	Minimum	Maximum	Cases
Assets (billion yen)	100.1	16.6	264.0	1.11	1632.9	233
Number of employees (hundreds)	53.8	12.3	127.3	1.08	717.9	233
Pre-tax operating income / assets (ROA)	0.064	0.062	0.039	-0.047	0.20	233
Interest costs / (total debt - bonds)	0.037	0.038	0.016	0.0057	0.081	233
Bank loans / total debt	0.30	0.30	0.14	0.0045	0.65	233
Total debt / assets	0.73	0.73	0.13	0.36	1.17	233
Cash-flow / assets	1.27	1.22	0.31	0.68	2.56	233
Market to book[1]	1.38	1.33	0.28	0.92	2.77	233
Top ten shareholders' ownership	0.49	0.47	0.15	0.19	0.82	233
Main bank's loan share	0.30	0.26	0.16	0.12	1.00	233
Main and second banks' loan share	0.48	0.45	0.17	0.23	1.00	233
Herfindahl index[2]	0.18	0.15	0.15	0.044	1.00	233

(2)

March 1995 - March 1998	Mean	Median	Std. Deviation	Minimum	Maximum	Cases
Assets (billion yen)	359.0	57.4	871.9	3.17	4292.2	283
Number of employees (hundreds)	64.4	14.8	147.8	0.52	766.8	283
Pre-tax operating income / assets (ROA)	0.025	0.025	0.034	-0.14	0.17	233
Interest costs / (total debt - bonds)	0.011	0.0093	0.0075	0.00024	0.043	283
Bank loans / total debt	0.25	0.21	0.17	0.0035	0.82	283
Total debt / assets	0.62	0.63	0.17	0.16	0.97	283
Cash-flow / assets	1.05	1.01	0.29	0.77	2.68	283
Market to book[1]	1.43	1.39	0.28	0.77	2.68	283
Top ten shareholders' ownership	0.45	0.41	0.13	0.23	0.76	283
Main bank's loan share	0.34	0.29	0.16	0.083	1.00	283
Main and second banks' loan share	0.55	0.51	0.19	0.17	1.00	283
Herfindahl index[2]	0.22	0.18	0.15	0.034	1.00	283

1. Market to book = (total outstanding shares × the firm's share prices + total liabilities) / total assets
2. Herfindahl index = the sum of the squared proportions of loans from the first to the fifth largest creditors

The first proxy for lending concentration is the proportion of loans from a main bank to total bank debt. A main bank is special for a borrower and should be distinguished from other banks. It plays a unique role as a delegated monitor (e.g. Diamond (1984), Aoki and Patrick (1994)) and the extent of its dominance is usually assumed to affect the borrower's performance[3]. In our sample, the proportion of main bank loans is 30 per cent on average during the period 1978-80 and 34 per cent during 1995-98. The dominance of a main bank is sometimes substantial. For example, the difference in the loan share between the main bank and the second bank is more than 15 percentage points for 19 (25) firms out of 81 in 1980 (1998). Figure 3.1 (1) presents the case of "Sharp Corporation". This company borrowed from 7 banks in 1998, with the proportion of its loans coming from the main bank (Fuji Bank) being 36.2 per cent, about twice as high as that of the second bank.

In some cases, however, the second creditor has a comparable loan share and plays a complementary role. Among our 81 sample firms, there are 22 (11) in which the difference in the loan share between the first two banks is less than 3 percentage

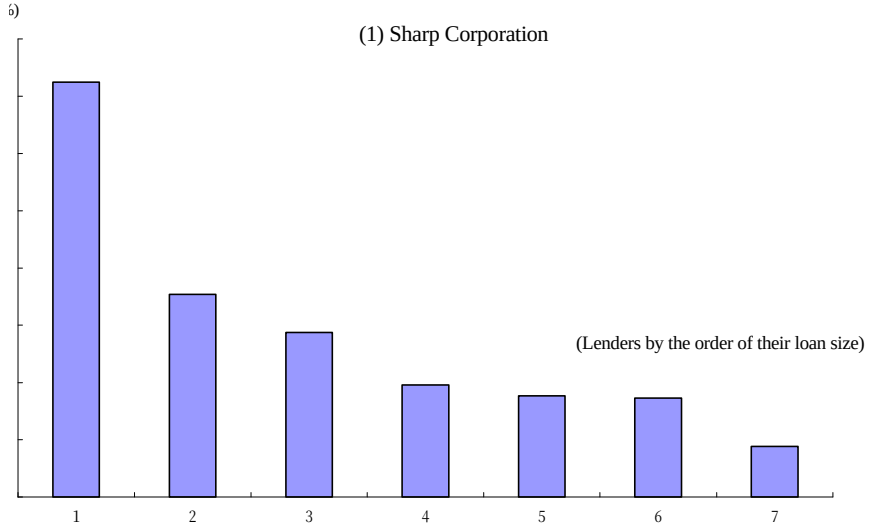
[3] Our sample includes loans from insurance companies, which have not acted as "delegated monitors" and their dominance might not be related to the borrowers' performance. The cases in which insurance companies are the main or second largest lenders for our sample firms are, however, only 22 out of 516 observations.

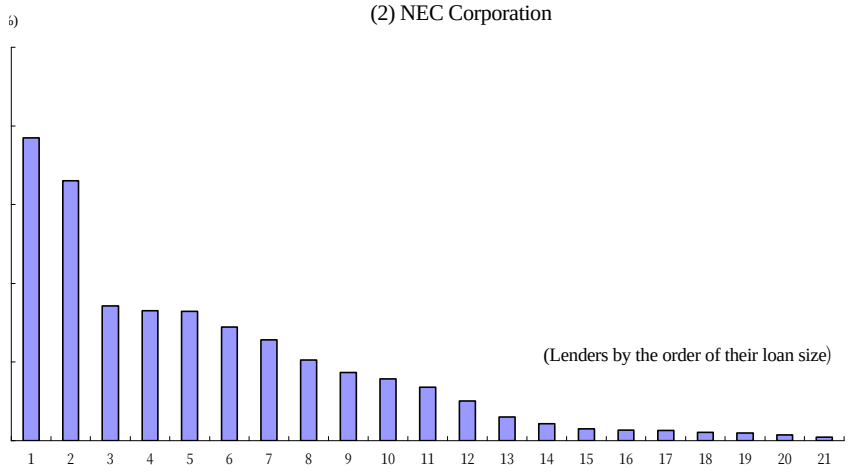
points in 1980 (1998). For example, “NEC Corporation” has its main bank (Sumitomo Bank) and second bank (Sumitomo Trust Bank), with loan proportions of 19.2 and 16.5 per cent respectively in 1998, figures that are substantially higher than those of other banks (Figure 3.1 (2)). Since the two banks are grouped in the same bank-centred corporate group (Sumitomo), the sum of the two proportions may be more important. Thus, we also consider the proportion of loans from the two largest creditors, main and second bank. The proportion of the main and second banks' loans averages 48 (55) per cent in 1978-80 (1995-98).

If we are concerned about the third or other subsequent lenders, we need a more comprehensive measure of lending concentration. This can be provided by the Herfindahl index. We define this as the squared sum of the loan proportions from the first to the fifth largest creditors. The average level of this index is 0.18 (0.22) in 1978-80 (1995-98).

Figure 3.1 The proportion of loans from each lender:

Examples of two large Japanese companies in the electrical machinary industry in March 1998





3.2.3 Further evidence on bank relationships

Our sample presents a marked difference between the two periods we are looking at. The average ratio of bank loans is lower in the late 1990s (25 per cent) than in the late 1970s (30 per cent). The number of firms without bank debt increased from two in 1978 to ten in 1995. There is also an increase in the number of firms who issued public debt from 28 in 1980 to 52 in 1995. Such changes may be partly related to the financial liberalisation of Japanese financial markets in the 1980s.

As we have seen, lending concentration, however, increased between the two sample periods despite the decline in overall bank dependence. This tendency holds for all the three variables used to proxy for lending concentration and may be partly associated with a number of mergers that took place among city banks.

Another interesting point is a difference between firms that have issued corporate bonds and those which have not. Table 3.2 shows that firms without public debt have a more concentrated borrowing structure and, thus, a higher proportion of main bank or two largest bank loans and a higher Herfindahl index in both sample periods. This is

consistent with some of the theories of bank relationships reviewed in Chapter 1.

Table 3.2 Banking relationships and access to public bond markets

	March 1978 - March 1980			March 1995 - March 1998		
	Firms with public bond issues	Firms without public bond issues	All firms	Firms with public bond issues	Firms without public bond issues	All firms
Main bank's loan share (on average)	0.27	0.32	0.30	0.32	0.37	0.34
Main and second banks' loan share (on	0.43	0.51	0.48	0.52	0.58	0.55
Herfindahl index (on average)	0.15	0.20	0.18	0.21	0.24	0.22
Number of lenders (on average)	15.3	10.5	12.1	10.7	9.1	10.0
Number of lenders accounting for 50 % of total credit (on average)	3.4	2.7	2.9	2.8	2.3	2.6
Number of observations	77	156	233	156	127	283

3.3 The firm's choice between relationship and arm's length financing: Evidence from reliance on bank loans

3.3.1 Theoretical foundations and related work

What type of firm is more likely to choose relationship financing (or arm's length financing)? To answer this question, this section will focus on the choice of private and public debt by our sample companies. As reviewed in Chapter 1, theoretical considerations show the following firm-specific characteristics affecting the extent of

bank loan dependence:

First, a larger or older firm (thus, one suffering from fewer information asymmetries) is expected to have a lower proportion of bank debt. Anderson and Makhija (1999) and Houston and James (1996) find such a negative relation between reliance on bank debt and firm size among Japanese and US selected firms respectively.

Second, credit-worthy companies (e.g. those with high net worth or high ratings) are likely to have less bank debt (Diamond (1991)). Thus, highly leveraged firms presumably have higher credit risks and should therefore be expected to rely more on bank borrowing due to their limited access to public debt markets. The available empirical evidence is, however, ambiguous. Thus, Hoshi et al. (1993) and Anderson and Makhija (1999) find a positive correlation between leverage ratios and reliance on bank debt in their sample of selected Japanese firms, while Houston and James (1996) show a negative effect of leverage on the proportion of bank loans for their samples of US companies. Thus, it may be interesting to investigate the leverage effect further in a different sample of Japanese firms.

Third, firms with high-growth opportunities (measured, for example, by the ratio of a firm's market to its book value), have two opposite incentives when they choose bank loans. They are usually more subject to severe information problems[4], and thus, tend to count on bank debt because banks' monitoring mitigates informational problems between lenders and borrowers. Hence, if these firms have a higher proportion of bank loans, they may well enjoy "monitoring benefits".

Equally, however, firms with high-growth opportunities may want to reduce reliance on bank lending. There are several possible explanations for such lower bank dependence. These firms may have more attractive investment opportunities. In such a case, they will have less incentive to engage in moral-hazard activities and thus will have less need for bank monitoring (Hoshi et. al. (1993)). Alternatively, high growing firms, expecting potential hold-up or bank information monopolies at later stages of their on-going bank relationship, may also rely less on bank loans (Rajan (1992), Sharp (1990)).

[4] Firms with a high market value relative to their book value may have a relatively large proportion of intangible assets including human capital. This is another source of information asymmetries.

Hence, the relationship between bank dependence and growth potential is theoretically ambiguous. In the case of US firms, Houston and James (1996) find that the reliance on bank debt is negatively related to the importance of growth opportunities for companies with a single bank relationship or with no public debt, while the link is positive for companies borrowing from multiple banks or with public debt. The two authors suggest that firms with different funding sources are less prone to "hold-up" problems, a finding that is consistent with the prediction of Rajan (1992).

For Japanese firms, Hoshi et al. (1993) find no significant correlation between growth opportunities (proxied by Tobin's Q) and bank debt ratios. Within firms affiliated to corporate groups, however, those with higher Tobin's Q values have a lower proportion of bank loans. In contrast, the empirical analysis of Anderson and Makhija (1999) does not support the "hold-up" hypothesis. They find that the share of bank debt is positively correlated to growth opportunities in their full sample in the late 1980s, though negatively correlated for firms with some access to public bond issues. Thus, they conclude that Japanese bank financing provides "monitoring benefits" and reduces agency costs, while not imposing significant "hold-up" costs.

Their study deals with the determinants of the debt financing pattern of Japanese firms in a comprehensive way and is comparable to that of Houston and James (1996). Their sample period is, however, limited to the year 1990 and it is unclear whether their conclusion still holds for different sample periods. Thus, we next examine how different firm-specific factors affected bank dependence ratios in the 1970s and the 1990s.

3.3.2 Methodology and empirical evidence

Methodology

We estimate the following equation. Our dependent variable is the ratio of bank loans to total debt and is explained by the following independent variables:

(1) logarithm of employees

(2) ratio of total debt to assets

(3) market-to-book ratio

The first variable is a proxy for firm size. As we have seen, larger firms may be less bank-dependent due to fewer informational problems. Thus, the coefficient on firm size

is expected to be negative. The second explanatory variable is the leverage ratio. Highly leveraged firms may have limited access to public debt and thus be more bank-dependent. We predict that the coefficient on the leverage ratio will be positive.

The third explanatory variable, the market-to-book ratio, represents the firm's growth opportunities. The market-to-book ratio is defined as follows:

(total outstanding shares × the firm's share prices + total liabilities) / total assets

One concern about the use of the market to book ratio as a proxy for growth potential is whether this ratio is really a good predictor of growth opportunities or not. We estimate OLS regressions that explain realised sales growth a year ahead by the market to book ratio and obtain positive and statistically significant coefficients on this ratio in both sample periods. This would seem to confirm the relevance of this variable as a proxy for growth potential.

The effect of growth opportunities on bank dependence is theoretically ambiguous. The sign of the coefficient will depend on the relative importance of "monitoring benefits" for borrowers. For example, if "monitoring benefits" were more important for high

growing firms, we would expect growth opportunities to have a positive relation with reliance on bank loans. Table 3.3 reports the correlation matrix for these explanatory variables and for a number of others that will be used in subsequent regressions.

Table 3.3 Correlation matrix for explanatory variables

(1)

March 1978-March 1980	Pre-tax operating income / assets (ROA)	Interest costs / (total debt - bonds)	Bank loans / total debt	Total debt / assets	Cash-flow / assets	Market to book	Top ten shareholders' ownership	Main bank's loan share	Main and second banks' loan share	Herfindahl index
Logarithm of employees	-0.0085	-0.25	-0.18	0.17	-0.34	-0.25	-0.14	-0.25	-0.38	-0.24
Pre-tax operating income / assets (ROA)		-0.23	-0.23	-0.31	0.058	0.18	0.064	0.24	0.20	0.24
Interest costs / (total debt - bonds)			0.72	0.35	-0.080	0.12	-0.10	-0.10	-0.086	-0.14
Bank loans / total debt				0.47	-0.36	0.048	0.067	-0.31	-0.33	-0.35
Total debt / assets					-0.25	-0.22	0.17	-0.24	-0.27	-0.27
Cash-flow / assets						0.15	0.12	0.50	0.61	0.56
Market to book							0.088	0.24	0.24	0.26
Top ten shareholders' ownership								0.017	0.013	0.047
Main bank's loan share									0.93	0.96
Main and second banks' loan share										0.90

Number of observations: 233

(2)

March 1995-March 1998	Pre-tax operating income / assets (ROA)	Interest costs / (total debt - bonds)	Bank loans / total debt	Total debt / assets	Cash-flow / assets	Market to book	Top ten shareholders' ownership	Main bank's loan share	Main and second banks' loan share	Herfindahl index
Logarithm of employees	0.087	-0.21	-0.30	0.047	-0.16	-0.17	-0.23	-0.32	-0.39	-0.31
Pre-tax operating income / assets (ROA)		-0.11	-0.076	-0.074	0.18	0.19	0.021	-0.098	-0.053	-0.11
Interest costs / (total debt - bonds)			0.53	0.31	-0.15	0.11	-0.13	-0.019	-0.087	-0.044
Bank loans / total debt				0.55	-0.021	-0.026	0.19	-0.069	-0.12	-0.15
Total debt / assets					0.23	-0.0025	0.14	-0.26	-0.35	-0.33
Cash-flow / assets						0.13	0.22	0.021	0.091	0.045
Market to book							0.035	0.10	0.047	0.084
Top ten shareholders' ownership								0.028	0.12	0.046
Main bank's loan share									0.93	0.97
Main and second banks' loan share										0.94

Number of observations: 283

Empirical evidence

Table 3.4 presents the results of OLS regressions with firm dummy variables and period effects for the sample of panel data during the period March 1978 - March 1980 (regression (1)) and March 1995 - March 1998 (regression (3)).

Neither firm size nor the leverage ratio seem to explain much. On the other hand, the coefficients on the proxy for growth potential are statistically significant in both periods: interestingly, the use of bank debt is positively related to the potential growth opportunities of firms in the late 1970s (regression (1)), but negatively in the late 1990s (regression (3)). This may suggest that "monitoring benefits" played an important role in determining bank dependence in the 1970s, but this role has diminished through time. Bank relationships, in other words, may have become less beneficial in the 1990s, especially for firms with higher growth potential.

Differences between firms with public debt and those without it

Some may, however, consider that these different results between the two sample periods are related not to the extent of "monitoring benefits" but simply to the

institutional limitation on raising funds other than through bank debt in the 1970s[5].

Thus, we, next, examine whether there are differences in the choice of bank debt between firms with public debt issues and those without them (regressions (2) and (4) in Table 3.4). We incorporate an additional variable in the original regressions, the market-to-book ratio multiplied by a public bond dummy (firms with public bond issues = 1, otherwise = 0). This variable can pick up a specific effect of the market-to-book ratio for firms issuing public debt. In regression (2), the coefficient on this additional variable is both negative (-0.031) and significant, while the coefficient on the market-to-book ratio remains positive (0.073) and significant.

This would suggest that "monitoring benefits" were smaller, but still existed even among firms issuing corporate bonds already in the late 1970[6]. In contrast, there is a negative and statistically significant relation between the market-to-book ratio (as well as the additional variable) and the proportion of bank debt in regression (4). This means that "monitoring benefits" have diminished not only among firms with public debt but also among those without it during the late 1990s.

[5] For example, unsecured bond issuance was not permitted in the 1970s.
[6] For these firms, the overall coefficient on the market to book ratio is 0.042 (= 0.073 - 0.031).

Table 3.4 Determinants of bank dependence

	Dependent variable: Bank loans / total debt			
	March 1978 - March 1980		March 1995 - March 1998	
Independent variable:	(1)	(2)	(3)	(4)
Constant	0.22	0.15	0.59	0.73
	(0.49)	(0.34)	(1.57)	(1.99)*
Logarithm of employees	-0.012	-0.0041	-0.039	-0.063
	(-0.21)	(-0.07)	(-0.77)	(-1.26)
Total debt / assets	0.11	0.13	0.14	0.19
	(1.02)	(1.23)	(1.26)	(1.78)*
Market / book	0.067	0.073	-0.097	-0.074
	(2.30)**	(2.52)**	(-3.74)***	(-2.86)***
Market / book × Public bond dummy		-0.031		-0.036
		(-1.80)*		(-3.69)***
Adjusted R-squared	0.91	0.91	0.88	0.89
Number of observations	233	233	283	283

1. These regressions are estimated by the two-way fixed effect model (with firm dummy variables and period effects).

2. t-statistics in parentheses. "***", "**" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

In the 1970s, for bank-dependent firms, especially those without access to public bond issues, “monitoring benefits” may have been large, as Anderson and Makhija (1999) detected in their sample for the late 1980s. In the late 1990s, however, the relation between growth opportunities and reliance on bank loans becomes significantly

negative in our sample. This outcome is similar to that of the US investigated by Houston and James (1996).

Another interesting question is whether the extent of “monitoring benefits” is related to multiple banking relationships, an issue also examined by Houston and James (1996). The Japanese electrical machinery companies in our sample arrange their borrowing from about ten banks on average. Thus, we divide the sample into two groups: firms with a number of lenders below the median and firms with a number of lenders above the median. In Table 3.5, we estimate similar regressions to those of Table 3.4 with the proportion of bank loans as the dependent variable.

In the late 1970s, there is a positive and statistically significant relation between reliance on bank debt and growth opportunities among firms with small numbers of lenders (regression (1)), while an insignificant relation is found for the other group (regression (2)). In the late 1990s, on the other hand, we find a negative and statistically significant correlation for both groups (regressions (3) and (4)). Thus, “monitoring benefits” seem to have been enjoyed particularly by firms with small numbers of lenders in the 1970s, while such a difference disappears in the 1990s.

Table 3.5 Determinants of bank dependence:
Differences between firms with more and fewer lenders

	Dependent variable: Bank loans / total debt			
	March 1978 - March 1980		March 1996 - March 1998	
	Number of lenders less than (<=) 10 (median)	Number of lenders greater than (>) 10 (median)	Number of lenders less than (<=) 9 (median)	Number of lenders greater than (>) 9 (median)
Independent variable:	(1)	(2)	(3)	(4)
Constant	0.13	0.86	0.48	0.68
	(0.23)	(0.95)	(1.08)	(0.62)
Logarithm of employees	-0.0025	-0.091	-0.027	-0.049
	(-0.03)	(-0.80)	(-0.40)	(-0.37)
Total debt / assets	0.053	0.21	0.11	0.18
	(0.34)	(1.35)	(0.65)	(1.17)
Market / book	0.084	0.023	-0.095	-0.091
	(2.11)**	(0.45)	(-2.59)**	(-2.20)**
Adjusted R-squared	0.90	0.90	0.83	0.92
Number of observations	102	131	153	130

1. These regressions are estimated by the two-way fixed effect model (with firm dummy variables and period effects).
2. t-statistics in parentheses. "***", "**" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

Why have "monitoring benefits" diminished over these two decades? There are at least two possible explanations. First, such a change may be consistent with the life-cycle theory of bank-firm relationships (Perterson and Rajan (1995)): during the period, our sample firms have gradually matured and become more established. Hence they are now less likely to suffer from information problems. This may have reduced the additional benefits generated from existing lending relationships. The results would

then suggest that, by the 1990s, more firms may have reached the stage at which they no longer enjoy “monitoring benefits”.

The second and complementary explanation focuses on the economic and institutional changes that affected Japanese banks and borrowers over the past two decades. For example, the financial liberalisation that started from the end of the 1970s, and the burst of the bubble economy in the early 1990s, should have reduced the rents (“pies”) that banks obtained from their lending relationships with borrowers. This, in turn, would have implied that the lenders could no longer afford to closely monitor their clients. Consequently, “monitoring benefits” for borrowers might have been reduced for this reason, too.

3.4 Bank relationships and firm performance: Evidence on interest costs and profitability

3.4.1 Related work

In the previous section, we investigated the reliance on bank debt. The next important question is to see how the strength of bank relationships has influenced the performance of Japanese manufacturing firms over the past decades. Did the close ties between lenders and borrowers work well during the 1970s, before the liberalisation of Japanese financial markets, and perform badly in the 1990s, after the burst of the bubble economy? More generally, in what circumstances does relationship-based financing function well?

Among the related empirical literature surveyed in Chapter 1, Weinstein and Yafeh (1998) show that Japanese firms linked to main banks (1) faced higher interest payment, (2) had lower profitability, and (3) recorded slightly lower growth rates than their industry peers in the sample period 1977-86. This evidence of lower profitability and growth rates of main bank clients was also found by them for the earlier post-war

period (1956-71). Given that Nakatani (1984) found similar results for the 1970s, Weinstein and Yafeh (1998) conclude that there is no evidence of the superior performance of main bank client firms at any time in the post-war period[7].

One problem with this analysis lies in the two authors' definition of "firms with main banks", which are identified as those that are part of a bank-centred financial corporate group. Non-group firms, however, also have their own main banks from which they obtain the largest proportion of their borrowing and with which they keep close ties. Thus, it is important to consider the role of main banks in a broader sense.

Morck, Nakamura and Shivdasani (2000) focus on the role of equity ownership by main banks. They examine the relationship between a firm's ownership (as opposed to borrowing) structure and its performance (e.g. Q ratio, profitability and interest costs). They find, for example, a negative (non-linear) relationship between main bank ownership and profitability, using data for 1986, but provide no results for other periods.

[7] Some doubts on the benefits from banking relationships in Japan are also presented by Kang and Stulz (2000) and Kang and Shivdasani (1999), using data for the early 1990s. They show that firms with less or no reliance on bank loans had a better profitability performance than bank-dependent companies in the early 1990s.

To overcome the limitations of the exiting literature, it is important to examine alternative, and possibly more appropriate, variables measuring the closeness of banking relationships, including main bank relations, and compare their effects on firm performance in different periods of the post-war era, as done by Weinstein and Yafeh (1998).

To measure the strength of bank relationships, we focus on the firm's borrowing structure in more detail. If we understand that both group and non-group firms normally have a main bank with which they have close links, the share of the main bank's loans appears to be a reasonable proxy for the intensity of banking relationships. In addition, to examine the intensity of these relationships further, we use the more comprehensive variables representing the concentration of lenders that we introduced in Section 3.2. These are then used to consider the effects on firm performance, especially interest costs and profitability.

3.4.2 Bank relationships and interest costs

Methodology

First, we consider the relationship between the concentration of lenders and the interest costs paid by borrowers. Thus, we estimate the following reduced-form equation:

Our dependent variable is the ratio of interest costs[8] to total debt (minus corporate bonds) as a proxy for the interest rate on bank loans and this is explained by the following independent variables:

(1) logarithm of employees

(2) proportion of total debt to assets

(3) proportion of cash-flow[9] to assets

(4) public bond dummy

(5) proxies for lending concentration

[8] Interest payments on corporate bonds and commercial paper are deducted from these interest costs.
[9] Cash-flow is defined as the sum of proceeds from sales and depreciation costs.

The first variable is a proxy for firm size. Larger firms may have lower interest costs due to fewer informational problems. Thus, the coefficient on firm size is expected to be negative. The second control variable is the leverage ratio. Highly leveraged firms are presumably those with higher credit risks and thus we predict that loan rates would be higher for these firms.

The third control variable is the cash-flow ratio. Firms with higher cash-flow ratios have less need for bank loans and may pay lower interest costs. Thus, a negative relationship is expected.

The fourth control variable is equal to one if a firm issues public bonds and zero otherwise. Firms with access to the public bond market are presumably established and of high-quality. Thus, a negative relationship is also predicted in this instance.

Finally, we introduce the three variables that measure the intensity of bank relationships and which were described in Section 3.2.2 above.

Empirical evidence

Table 3.6 presents the results of regressions using data for the two periods, with firm-level fixed effects[10]. First, firm size, contrary to our prediction, has a positive relation with interest costs, but the coefficients are significant only for the late 1990s (regressions (4), (5) and (6) in Table 3.6). Second, interest costs are positively correlated to the leverage ratio and negatively to the cash-flow ratio, as predicted. The coefficients (on the leverage ratio), however, are statistically significant only for the period of the late 1970s (regressions (1), (2) and (3)). Third, firms with access to public bond markets paid lower interest costs in the 1970s[11].

Controlling for these variables[12], we find a negative relationship between interest costs and the three proxies for lender concentration that we are using. In other words, the evidence suggests that firms with more concentrated borrowing structures paid lower interest rates. It should be noted, however, that only two of the six coefficients of lending concentration were statistically significant, and both these were in the 1995-98

[10] We also estimated regressions with both firm dummy variables and period effects, but their performance appeared to be inferior.
[11] In the 1990s, this relationship was positive, but statistically insignificant.
[12] Another plausible control variable may be the ratio of long-term loans to total loans, since firms with relatively more long-term loans may have to pay higher interest costs. We added this variable to the above regressions. The estimated coefficients were statistically significant only in the late 1970s, but had no significant impact on the coefficients on lending concentration.

period (regressions (4) and (6)). This limits the significance of our results for the period 1978-80.

Table 3.6 Determinants of interest costs

	Dependent variable: Interest costs / (total debt - bonds)					
	March 1978 - March 1980			March 1995 - March 1998		
Independent variables:	(1)	(2)	(3)	(4)	(5)	(6)
Logarithm of employees	0.0098 (1.35)	0.010 (1.39)	0.0094 (1.31)	0.017 (5.07)***	0.017 (4.87)***	0.017 (5.08)***
Total debt / assets	0.044 (2.45)**	0.046 (2.64)***	0.044 (2.43)**	0.0056 (0.72)	0.0068 (0.86)	0.0051 (0.64)
Cash-flow / assets (cash-flow = sales + depreciation costs)	-0.0073 (-1.18)	-0.0074 (-1.19)	-0.0061 (-0.99)	-0.0028 (-0.76)	-0.0027 (-0.71)	-0.0030 (-0.83)
Main bank's loan share	-0.020 (-1.16)			-0.0093 (-2.36)**		
Main and second banks' loan share		-0.013 (-1.03)			-0.0058 (-1.45)	
Herfindahl index			-0.036 (-1.62)			-0.0088 (-2.19)**
Public bond dummy	-0.011 (-4.58)***	-0.011 (-4.49)***	-0.011 (-4.60)***	0.0012 (1.25)	0.0012 (1.24)	0.0012 (1.27)
Adjusted R-squared	0.74	0.74	0.74	0.68	0.68	0.68
Number of observations	233	233	233	283	283	283

1. These regressions are estimated by the one-way fixed effect model (with firm dummy variables).

2. t-statistics in parentheses. "***", "**" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

3. Heteroskedasticity consistent estimates of standard errors by White (1980) are used to calculate the t-statistics for regressions.

3.4.3 Bank relationships and profitability

Methodology

Next, we consider the relationship between the concentration of lenders and borrowers' profitability. We estimate the following reduced-form equation:

Our dependent variable is return on assets (ROA) defined by the ratio of pre-tax operating income to total assets and is explained by the following independent variables:

(1) logarithm of employees

(2) proportion of total debt to assets

(3) proportion of cash-flow to assets

(4) top ten shareholders' ownership

(5) proxies for the concentration of lenders

The first variable is a proxy for firm size. This is included to control for market power. More market power is expected to result in higher profitability. In the presence of agency problems and capital market imperfections, the balance sheet structure of a firm (i.e. the leverage and cash-flow ratios) may also be associated with firm

profitability. Among financially-constrained firms, those with higher leverage may have greater difficulties in obtaining funds for necessary investment and would tend to have lower profitability, while those with ample cash-flow would be able to exploit profitable investment opportunities and enjoy higher returns.

In contrast, for firms under no financial constraint, high levels of cash-flow could generate “free-cash-flow problems”, i.e. situations in which abundant liquid resources are used to finance inefficient investment (Jensen (1986)). In such instances, an abundance of cash flow would be associated with lower profitability. Pressure from debt finance could, in these circumstances, provide a necessary discipline on the borrower. This implies that higher leverage ratios might improve firm profitability. To sum up, we predict that the coefficient on the leverage variable will be negative (positive) and that on the cash-flow ratio will be positive (negative) for financially-constrained (unconstrained) firms.

The fourth variable (i.e. the proportion of a firm's equity owned by the ten largest shareholders) is included to control for the effect of ownership structure on firm profitability. Ownership concentration, or the existence of large block holders, may be

associated with better monitoring and discipline provided by these shareholders and may thus lead to higher profitability.

Finally, we introduce the three variables measuring the concentration of lending banks and consider their relationship with firm profitability. Similarly to the previous discussion, the sign of these variables is theoretically ambiguous.

Empirical evidence

The results of regressions with firm-level fixed effects[13] are presented in Table 3.7. First, (and contrary to our prediction) the coefficient on firm size is negative in both periods, but it is marginally statistically significant only for the sample of the late 1990s. The leverage and cash-flow ratios have a (weak) negative and a (strong) positive correlation to firm profitability respectively. Our sample firms appear to be financially-constrained and free from "free-cash-flow problems". The relationship between ownership concentration and profitability is positive as we predict, but statistically not really significant.

[13] We also estimated regressions with both firm dummy variables and period effects, but their performance appeared to be inferior.

Table 3.7 Determinants of profitability (ROA): A linear case

	Dependent variable: Pre-tax operating profits / assets					
	March 1978 - March 1980			March 1995 - March 1998		
Independent variables:	(1)	(2)	(3)	(4)	(5)	(6)
Logarithm of employees	-0.0034	-0.0043	-0.0037	-0.029	-0.029	-0.030
	(-0.08)	(-0.10)	(-0.09)	(-1.70)*	(-1.69)*	(-1.74)*
Total debt / assets	-0.090	-0.095	-0.090	-0.052	-0.057	-0.050
	(-1.72)*	(-1.83)*	(-1.73)*	(-1.12)	(-1.26)	(-1.06)
Cash-flow / assets	0.10	0.10	0.10	0.10	0.10	0.10
(cash-flow = sales + depreciation costs)	(5.66)***	(5.57)***	(5.55)***	(3.92)***	(3.98)***	(3.93)***
Top ten shareholders' ownership	0.086	0.084	0.084	0.11	0.12	0.11
	(1.66)*	(1.63)	(1.60)	(1.74)*	(1.79)*	(1.71)*
Main bank's loan share	0.048			0.017		
	(1.38)			(0.61)		
Main and second banks' loan share		0.028			0.0030	
		(0.93)			(0.14)	
Herfindahl index			0.066			0.018
			(1.30)			(0.60)
Adjusted R-squared	0.68	0.67	0.68	0.70	0.70	0.70
Number of observations	233	233	233	283	283	283

1. These regressions are estimated by the one-way fixed effect model (with firm dummy variables).

2. t-statistics in parentheses. "***", "**" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

3. Heteroskedasticity consistent estimates of standard errors by White (1980) are used to calculate the t-statistics for regressions.

Controlling for the above variables, we examine the relation between lending concentration and firm profitability. All of our proxy variables have positive but insignificant coefficients in both sample periods.

The possibility of a non-linear relationship

These results are clearly disappointing. It is possible, however, that the relationship between lending concentration and profitability is non-linear[14]. To explore this possibility further, we add the squares of the lending concentration variables to our regressions and Table 3.8 shows the results. Inclusion of these squared variables hardly alters the magnitude or significance levels of the control variables. For the period 1978-80, only the main and second banks' loan share variable shows statistically significant coefficients, with the linear and squared terms having a positive and a negative coefficient respectively. On the other hand, the coefficients on the main bank's loan share and on the Herfindahl index are not statistically significant.

[14] Some of the literature on corporate governance stresses the existence of a non-linear relationship between concentrated equity ownership and firm performance (e.g. Burkhart, Gromb and Panunzi (1997), and Morck, Nakamura and Shivdasani (2000)).

Table 3.8 Determinants of profitability (ROA): A non-linear case

	Dependent variable: Pre-tax operating profits / assets					
	March 1978 - March 1980			March 1995 - March 1998		
Independent variables:	(1)	(2)	(3)	(4)	(5)	(6)
Logarithm of employees	-0.0029	-0.0022	-0.0046	-0.033	-0.032	-0.033
	(-0.07)	(-0.05)	(-0.11)	(-1.85)*	(-1.82)*	(-1.87)*
Total debt / assets	-0.089	-0.094	-0.091	-0.046	-0.056	-0.048
	(-1.74)*	(-1.81)*	(-1.76)*	(-0.97)	(-1.25)	(-1.01)
Cash-flow / assets	0.10	0.10	0.10	0.11	0.11	0.10
(cash-flow = sales + depreciation costs)	(5.54)***	(5.46)***	(5.47)***	(4.03)***	(4.10)***	(4.08)***
Top ten shareholders' ownership	0.088	0.094	0.083	0.12	0.11	0.11
	(1.66)*	(1.75)*	(1.57)	(1.82)*	(1.74)*	(1.82)*
Main bank's loan share	0.068			-0.10		
	(0.38)			(-2.03)**		
(Main bank's loan share)^2	-0.024			0.11		
	(-0.10)			(1.97)**		
Main and second banks' loan share		0.48			-0.12	
		(2.75)***			(-1.99)**	
(Main and second banks' loan share)^2		-0.40			0.099	
		(-2.56)**			(1.78)*	
Herfindahl index			0.048			-0.094
			(0.57)			(-2.29)**
(Herfindahl index)^2			0.027			0.12
			(0.18)			(2.30)**
Adjusted R-squared	0.67	0.68	0.67	0.70	0.70	0.70
Number of observations	233	233	233	283	283	283

1. These regressions are estimated by the one-way fixed effect model (with firm dummy variables).

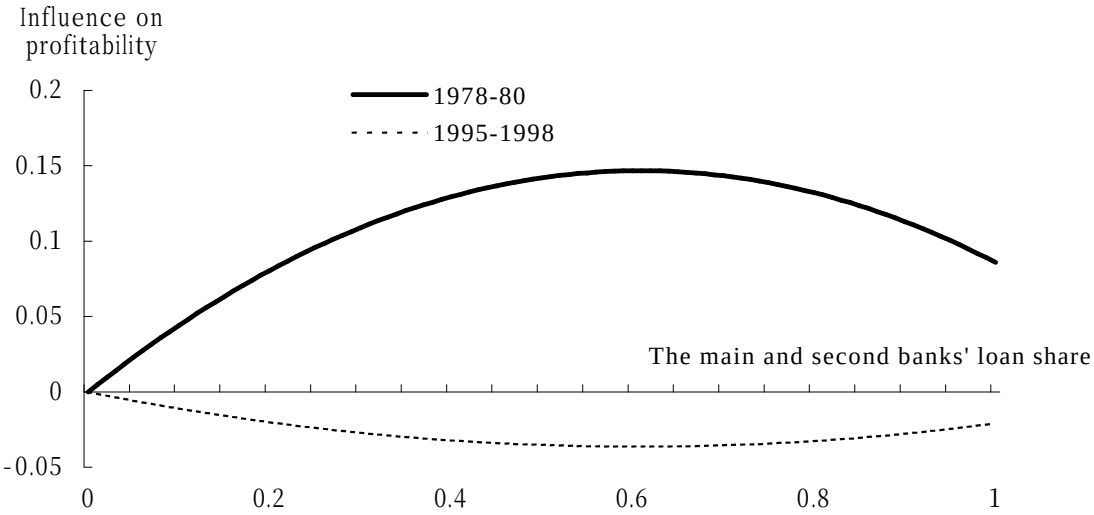
2. t-statistics in parentheses. "***", "**" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

3. Heteroskedasticity consistent estimates of standard errors by White (1980) are used to calculate the t-statistics for regressions.

The results for the period 1995-98 present a very different picture. Both the linear and squared terms of all the three proxies for lending concentration are statistically significant. For each variable, the linear term has a negative coefficient while the squared term has a positive one. Figure 3.2 presents the combined effects of the linear and squared terms of the main and second banks' share variable, since only this variable is statistically significant for both sample periods. The relationship with profitability is positive in the late 1970s, though its magnitude decreases as the loan share rises. This relationship, however, becomes negative and shows a U-shape pattern in the 1990s.

In other words, firms borrowing from highly concentrated lenders could possibly enjoy higher profitability in our earlier sample period, but had lower profitability during the more recent one. This may indicate that the main bank system, or the existence of very close relationships with a limited number of lenders, might have been beneficial for our sample firms in the late 1970s, but became less advantageous for them in the late 1990s.

Figure 3.2 A non-linear relationship between profitability and lending concentration: Differences between the late 1970s and the late 1990s



Differences between firms with and without public bond issues in the late 1970s

The insignificant relationship that was found in the late 1970s between some lending concentration variables and profitability may be related to our heterogeneous sample. In the previous section, we found a marked difference in the determinants of bank dependence between firms with public bond issues and those without them during the late 1970s. For example, firms with access to public bond markets had lower interest costs but enjoyed less “monitoring benefits”. Given this difference, we split our sample of firms into the two separate groups and estimate regressions for profitability with the same specification for the period 1978-80.

Table 3.9 shows the results of these regressions. As for the control variables, profitability is negatively and significantly related to firm size for firms with public bond issues, while insignificantly correlated for those without public bond issues. The leverage and cash-flow ratios have negative and positive coefficients respectively for both group of firms, which are basically significant, and this is consistent with our results for all sample firms.

We now examine the relationship between lending concentration and profitability. We use as proxy variables the main bank's loan share and the Herfindahl index, since their coefficients are not statistically significant for the full sample firms. For firms with public debt, the linear term of these variables has a negative coefficient while the squared term has a positive one and all are statistically significant (regressions (1) and (2) in Table 3.9). On the other hand, only the coefficients on the Herfindahl index are statistically significant for firms having no public bond issue and have different signs: the linear term has a positive coefficient, but the squared term has a negative one (regression (4)).

Table 3.9 Determinants of profitability (ROA) during the late 1970s:

Differences between firms with public debt and those without it

	Dependent variable: Pre-tax operating profits / assets			
	March 1978 - March 1980			
	Firms with public bond issues		Firms without public bond issues	
Independent variables:	(1)	(2)	(3)	(4)
Logarithm of employees	-0.26 (-6.68)***	-0.25 (-6.31)***	0.20 (0.43)	0.019 (0.41)
Total debt / assets	-0.14 (-2.46)**	-0.20 (-3.23)***	-0.078 (-1.31)	-0.082 (-1.38)
Cash-flow / assets (cash-flow = sales + depreciation costs)	0.13 (5.33)***	0.11 (4.93)***	0.092 (4.31)***	0.089 (4.02)***
Top ten shareholders' ownership	0.023 (0.47)	0.011 (0.24)	0.11 (1.79)*	0.10 (1.68)*
Main bank's loan share	-0.56 (-4.33)***		0.27 (1.56)	
(Main bank's loan share)^2	0.87 (6.06)***		-0.30 (-1.32)	
Herfindahl index		-0.14 (-2.06)**		0.19 (1.86)*
(Herfindahl index)^2		0.50 (9.11)***		-0.25 (-1.82)*
Adjusted R-squared	0.87	0.89	0.64	0.70
Number of observations	77	77	156	156

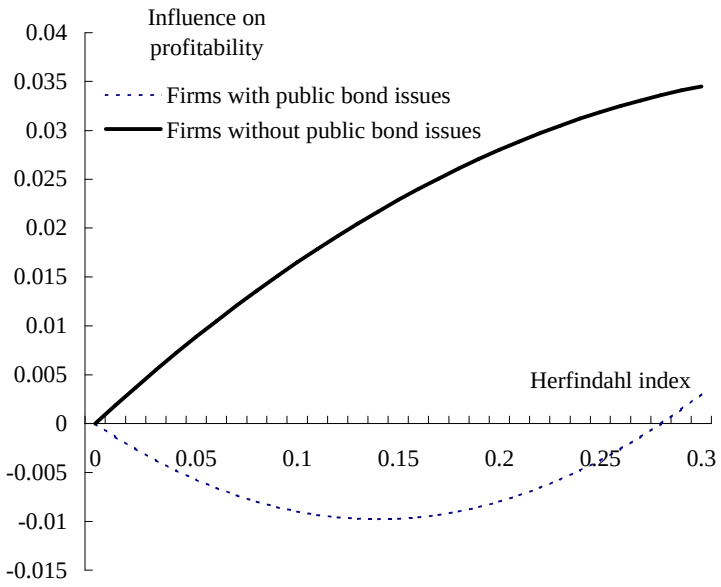
1. These regressions are estimated by the one-way fixed effect model (with firm dummy variables).

2. t-statistics in parentheses. "***", "**" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

3. Heteroskedasticity consistent estimates of standard errors by White (1980) are used to calculate the t-statistics for regressions.

Figure 3.3 shows the non-linear relationships between the Herfindahl index and profitability. At normal levels of these variables (i.e. in the neighbourhood of the averages, or 0.18), the relationship is positive for firms without public bond issues while only slightly negative and U-shaped for those with public bond issues. Thus, closer bank relationships, measured by lending concentration, seem to have been beneficial at least for firms with no public debt.

Figure 3.3 A non-linear relationship between profitability and lending concentration: Differences between firms with public debt and those without it in the late 1970s



The effect of main banks' financial conditions in the late 1990s

We now look at some of the reason for why banking relationships may have become less beneficial for borrowers in the 1990s. One possible hypothesis is that the quality of the banks' assets deteriorated significantly due to the asset price deflation that occurred in the 1990s. In these circumstances, banks found it difficult to play a role of financial intermediation including the close monitoring of their borrowers.

To test the above hypothesis, we add several variables as proxies for banks' financial conditions to the basic regressions with ROA as a dependent variable (regressions (4), (5) and (6) in Table 3.8). These variables are (1) a non-performing loan ratio, (2) an adjusted capital ratio and (3) a market to book ratio. They are calculated for the main banks with which our sample firms are linked[15].

Table 3.10 shows the results of these regressions. We find that firm profitability is negatively related to the non-performing loan ratio of the main bank and positively

[15] We will use these variables extensively in Chapter 4. Their definitions are:
(1) The non-performing loan ratio =loans to bankrupt borrowers / total loans
(2) The adjusted capital ratio = (own capital + loan loss reserves + unrealised capital gains (or losses) of investment securities) / total assets.
(3) The market to book ratio = (total outstanding shares × the bank's share price + total liabilities) / total assets

related to its adjusted capital ratio and market to book ratio. The coefficients on all the three proxies for the main bank's financial conditions are statistically significant at more than the five per cent level. The magnitude or significance levels do not depend on the choice of the lending concentration variables, most of which remain statistically significant. Hence, this evidence strongly suggests that firms whose main bank was poorly capitalised did worse than their peers in the late 1990s.

3.5 Robustness tests

3.5.1 Alternative measures of firm profitability

The robustness of our empirical results is examined in this section. First, we focus on the choice of indicators representing firm profitability, since there are several definitions of profitability and the ROA is only one of them. We test different specifications with (1) sales profitability (i.e. the proportion of pre-tax operating income to sales) and (2) ROE (i.e. the proportion of pre-tax operating income to net worth), as the dependent variables.

Table 3.10 Determinants of profitability (ROA): The effect of the main bank's financial conditions

	Dependent variable: Pre-tax operating profits / assets								
	March 1995 - March 1998								
Independent variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Logarithm of employees	-0.042	-0.043	-0.047	-0.042	-0.043	-0.048	-0.042	-0.044	-0.047
	(-2.20)**	(-2.31)**	(-2.47)**	(-2.20)**	(-2.29)**	(-2.50)**	(-2.19)**	(-2.32)**	(-2.46)**
Total debt / assets	-0.052	-0.056	-0.059	-0.063	-0.065	-0.068	-0.054	-0.058	-0.060
	(-1.10)	(-1.49)	(-1.22)	(-1.38)	(-1.45)	(-1.51)	(-1.13)	(-1.21)	(-1.24)
Cash-flow / assets	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
(cash-flow = sales + depreciation costs)	(4.13)***	(4.26)***	(4.23)***	(4.23)***	(4.33)***	(4.35)***	(4.18)***	(4.32)***	(4.27)***
Top ten shareholders' ownership	0.11	0.11	0.11	0.11	0.11	0.099	0.11	0.11	0.10
	(1.79)*	(1.85)*	(1.77)*	(1.71)*	(1.78)*	(1.67)*	(1.78)*	(1.85)*	(1.77)*
Main bank's loan share	-0.092	-0.078	-0.080						
	(-1.84)*	(-1.49)	(-1.54)						
(Main bank's loan share)^2	0.11	0.097	0.10						
	(1.94)*	(1.59)	(1.70)*						
Main and second banks' loan share				-0.13	-0.11	-0.13			
				(-2.05)**	(-1.73)*	(-2.05)**			
(Main and second banks' loan share)^2				0.11	0.090	0.11			
				(1.91)*	(1.60)	(1.95)*			
Herfindahl index							-0.082	-0.080	-0.070
							(-1.94)*	(-1.83)*	(-1.58)
(Herfindahl index)^2							0.11	0.11	0.10
							(2.14)**	(1.96)*	(1.84)**
Non-performing loan ratio of main bank	-1.07			-1.11			-1.01		
	(-2.22)**			(-2.29)**			(-2.13)**		
Adjusted capital ratio of main bank		0.41			0.42			0.41	
		(3.46)***			(3.52)***			(3.43)***	
Market to book ratio of main bank			0.15			0.16			0.15
			(3.27)***			(3.57)***			(3.09)***
Adjusted R-squared	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Number of observations	283	283	283	283	283	283	283	283	283

1. These regressions are estimated by the one-way fixed effect model (with firm dummy variables).

2. t-statistics in parentheses. "***", "**" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

3. Heteroskedasticity consistent estimates of standard errors by White (1980) are used to calculate the t-statistics for regressions.

With the use of the same explanatory variables, estimated results for sales profitability and ROE are shown in Table 3.11 and 3.12 respectively. The coefficients on the lending concentration variables are all statistically significant for the period of the late 1990s and have the same signs as those obtained by using the ROA as a measure of profitability. Hence, our results on the relationship between lending concentration and profitability seem robust to these alternative specifications.

3.5.2 An endogeneity problem

Another concern with our regressions is endogeneity between the dependent variable (ROA) and lending concentration. Thus, the estimated negative relation for the sample of the late 1990s could have been generated by banks monitoring their borrowers in financial distress (presumably with lower profitability) more closely, and increasing their lending share.

Table 3.11 Determinants of profitability (as a fraction of total sales)

	Dependent variable: Pre-tax operating profits / sales					
	March 1978 - March 1980			March 1995 - March 1998		
Independent variables:	(1)	(2)	(3)	(4)	(5)	(6)
Logarithm of employees	-0.021	-0.021	-0.022	-0.028	-0.027	-0.029
	(-0.74)	(-0.73)	(-0.78)	(-1.85)*	(-1.81)*	(-1.87)*
Total debt / assets	-0.078	-0.082	-0.080	-0.0087	-0.021	-0.0092
	(-2.11)**	(-2.22)**	(-2.16)**	(-0.23)	(-0.57)	(-0.24)
Cash-flow / assets	0.052	0.052	0.051	0.089	0.089	0.088
(cash-flow = sales + depreciation costs)	(3.23)***	(3.11)***	(3.15)***	(3.98)***	(4.10)***	(3.99)***
Top ten shareholders' ownership	0.069	0.073	0.066	0.067	0.058	0.064
	(1.76)*	(1.81)*	(1.68)*	(1.09)	(0.96)	(1.05)
Main bank's loan share	0.025			-0.13		
	(0.23)			(-2.89)***		
(Main bank's loan share)^2	0.026			0.16		
	(0.19)			(2.85)***		
Main and second banks' loan share		0.24			-0.17	
		(1.91)*			(-2.54)**	
(Main and second banks' loan share)^2		-0.19			0.15	
		(-1.81)*			(2.33)**	
Herfindahl index			0.033			-0.11
			(0.62)			(-2.66)***
(Herfindahl index)^2			0.037			0.16
			(0.46)			(3.01)***
Adjusted R-squared	0.70	0.70	0.70	0.77	0.77	0.77
Number of observations	233	233	233	283	283	283

1. These regressions are estimated by the one-way fixed effect model (with firm dummy variables).

2. t-statistics in parentheses. "***", "**" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

3. Heteroskedasticity consistent estimates of standard errors by White (1980) are used to calculate the t-statistics for regressions.

Table 3.12 Determinants of profitability (ROE)

	Dependent variable: Pre-tax operating profits / (assets - debt) (ROE)					
	March 1978 - March 1980			March 1995 - March 1998		
Independent variables:	(1)	(2)	(3)	(4)	(5)	(6)
Logarithm of employees	0.14 (0.42)	0.13 (0.39)	0.13 (0.38)	-0.057 (-0.76)	-0.052 (-0.70)	-0.058 (-0.78)
Total debt / assets	-0.44 (-1.01)	-0.46 (-1.06)	-0.46 (-1.05)	-0.021 (-0.12)	-0.064 (-0.41)	-0.025 (-0.15)
Cash-flow / assets (cash-flow = sales + depreciation costs)	0.37 (3.66)***	0.38 (3.64)***	0.37 (3.60)***	0.34 (3.07)***	0.34 (3.09)***	0.33 (3.09)***
Top ten shareholders' ownership	0.44 (1.31)	0.43 (1.28)	0.43 (1.27)	0.31 (1.19)	0.30 (1.13)	0.31 (1.16)
Main bank's loan share	0.041 (0.068)			-0.41 (-2.23)**		
(Main bank's loan share)^2	0.043 (0.058)			0.47 (1.98)**		
Main and second banks' loan share		0.42 (0.43)			-0.47 (-2.00)**	
(Main and second banks' loan share)^2		-0.44 (-0.57)			0.38 (1.77)*	
Herfindahl index			-0.13 (-0.36)			-0.35 (-2.74)***
(Herfindahl index)^2			0.24 (0.48)			0.47 (2.30)**
Adjusted R-squared	0.56	0.56	0.56	0.71	0.70	0.71
Number of observations	227	227	227	282	282	282

1. These regressions are estimated by the one-way fixed effect model (with firm dummy variables).

2. t-statistics in parentheses. "***", "**" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

3. Heteroskedasticity consistent estimates of standard errors by White (1980) are used to calculate the t-statistics for regressions.

To test causality from lending concentration to profitability directly, we use eighteen-year lagged values of the lending concentration variables (namely those for the period 1978-80) in the previous regressions for the period 1996-98 (regressions (4), (5) and (6) in Table 3.8). Table 3.13 reports the results. For all the three proxies for lending concentration, the linear and squared terms have negative and positive coefficients respectively and they are all statistically significant. Thus, our earlier finding that lending concentration affects firm profitability (Table 3.8) is confirmed by this test and endogeneity does not seem to be a crucial problem.

3.5.3 Alternative definition of main bank relations: Membership of bank-centred industrial groups

As we have seen, some researchers have defined a main bank relation as membership of a bank-centred industrial group (e.g. Nakatani (1984), Hoshi et. al (1991) and Weinstein and Yafeh (1998)). Thus, it may be interesting to see the effects of this alternative variable for main bank relations on firm profitability. In Japan, there are six large bank-centred corporate groups, Mitsui, Mitsubishi, Sumitomo, Fuyo, Sanwa, and DKB. The first three groups originated from the pre-war *Zaibatsus*. The other three are non-Zaibatsu groups in which the banks play a particularly important role.

Table 3.13 Determinants of profitability (ROA) with a lagged explanatory variable for lending concentration

	Dependent variable: Pre-tax operating profits / assets (ROA)		
	March 1996 - March 1998		
Independent variables:	(1)	(2)	(3)
Logarithm of employees	-0.053	-0.050	-0.056
	(-1.65)*	(-1.52)	(-1.69)*
Total debt / assets	-0.083	-0.092	-0.086
	(-1.26)	(-1.40)	(-1.30)
Cash-flow / assets	0.099	0.10	0.10
(cash-flow = sales + depreciation costs)	(3.83)***	(3.87)***	(3.81)***
Top ten shareholders' ownership	0.20	0.19	0.19
	(1.92)*	(1.92)*	(1.89)*
Main bank's loan share (eighteen-year lag))	-0.25		
	(-2.53)**		
(Main bank's loan share (eighteen-year lag))^2	0.23		
	(2.34)**		
Main and second banks' loan share (eighteen-year lag)		-0.35	
		(-2.95)***	
(Main and second banks' loan share (eighteen-year lag))^2		0.25	
		(2.60)**	
Herfindahl index (eighteen-year lag)			-0.17
			(-2.69)***
(Herfindahl index (eighteen-year lag))^2			0.18
			(2.61)***
Adjusted R-squared	0.71	0.71	0.71
Number of observations	212	212	212

1. These regressions are estimated by one-way fixed effect model.

2. t-statistics in parentheses. "***", "**" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

3. Heteroskedasticity consistent estimates of standard errors by White (1980) are used to calculate the t-statistics for regressions.

We construct the following dummy variables[16]:

(1) A dummy for the six large industrial groups (= 1 if a firm is affiliated with one of these groups and =0 otherwise)

(2) A dummy for the three *ex-Zaibatsu* groups (= 1 if a firm is affiliated with one of these groups and =0 otherwise)

(3) A dummy for the three *non-Zaibatsu* groups (= 1 if a firm is affiliated with one of these groups and =0 otherwise)

We use these dummy variables and the same control variables. Table 3.14 presents the estimated results of the pooled OLS regressions with ROA as the dependent variable. The dummy variables for corporate groups are basically insignificant in both sample periods. Only the coefficient on the dummy for the *non-Zaibatsu* groups is statistically significant and negative in the early sample period. Thus, the evidence suggests that there is no marked difference in profitability between firms affiliated with large industrial groups and those that are not both in the 1970s and in the 1990s.

[16] Among 81 sample firms, 53 (30: ex-Zaibatsu, 23: non-Zaibatsu) belong to the six large industrial groups.

Table 3.14 Determinants of profitability (ROA): The effect of membership of industrial groups

	Dependent variable: Pre-tax operating profits / assets			
	March 1978 - March 1980		March 1995 - March 1998	
Independent variables:	(1)	(2)	(3)	(4)
Constant	0.11 (4.35)***	0.11 (4.37)***	-0.013 (-0.81)	-0.014 (-0.87)
Logarithm of employees	0.0024 (1.19)	0.0024 (1.21)	0.0029 (1.99)**	0.0030 (2.01)**
Total debt / assets	-0.10 (-5.23)***	-0.10 (-5.23)***	-0.028 (-2.28)**	-0.027 (-2.25)**
Cash-flow / assets (cash-flow = sales + depreciation costs)	-0.0044 (-0.52)	-0.0061 (-0.71)	0.027 (3.71)***	0.027 (3.72)***
Top ten shareholders' ownership	0.037 (2.16)**	0.041 (2.34)**	0.0056 (0.35)	0.0066 (0.42)
Dummy for the six large industrial groups	-0.0061 (-1.08)		0.0031 (0.68)	
Dummy for the three ex-Zaibatsu groups		-0.0018 (-0.30)		0.0048 (0.97)
Dummy for the three non-Zaibatsu groups		-0.013 (-1.91)*		0.00071 (0.14)
Adjusted R-squared	0.10	0.11	0.05	0.05
Number of observations	233	233	283	283

1. These regressions are estimated by the pooled OLS model.

2. t-statistics in parentheses. "***", "**" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

This result is in sharp contrast with those presented by Nakatani (1984) and Weinstein and Yafeh (1998), who found negative relationships between main bank relations and firm performance even before the 1980s. To reconcile their results with ours, we incorporate as additional variables in the basic regressions the three lending concentration variables (both linear and squared terms) multiplied by the dummy for the six large industrial groups. These variables can pick up a specific lending concentration effect for firms affiliated with these groups.

Table 3.15 presents the results for the period 1978-80[17]. The linear and squared terms of the original lending concentration variables (which pick up the effects for the non-affiliated firms) are all statistically significant and have positive and negative coefficients respectively. The two additional variables (the main bank loan share in regression (1) and the Herfindahl index in regression (3)) are also statistically significant, but the linear and squared terms have a negative and a positive coefficient respectively for firms affiliated with the six industrial groups[18].

[17] The coefficients on the additional variables were not statistically significant in the late 1990s and thus we do not report them here.
[18] For example, 0.54 – 0.93 = -0.39 (the linear term), - 0.58 + 1.17 = 0.59 (the squared term) in regression (1).

Table 3.15 Determinants of profitability (ROA): The combined effect of lending concentration and membership of industrial groups

	Dependent variable: Pre-tax operating profits / assets		
	March 1978 - March 1980		
Independent variables:	(1)	(2)	(3)
Logarithm of employees	-0.0048	-0.0018	-0.0070
	(-0.11)	(-0.04)	(-0.17)
Total debt / assets	-0.11	-0.12	-0.11
	(-2.28)**	(-2.33)**	(-2.32)**
Cash-flow / assets	0.11	0.10	0.10
(cash-flow = sales + depreciation costs)	(5.75)***	(5.13)***	(5.47)***
Top ten shareholders' ownership	0.097	0.090	0.093
	(1.87)*	(1.69)*	(1.81)*
Main bank's loan share	0.54		
	(3.14)***		
(Main bank's loan share)^2	-0.58		
	(-2.80)***		
Main bank's loan share×dummy for the six large industrial groups	-0.93		
	(-4.07)***		
(Main bank's loan share)^2×dummy for the six large industrial groups	1.17		
	(4.27)***		
Main and second banks' loan share		1.03	
		(4.82)***	
(Main and second banks' loan share)^2		-0.78	
		(-4.69)***	
Main and second banks' loan share×dummy for the six large industrial groups		-0.73	
		(-1.93)*	
(Main and second banks' loan share)^2×dummy for the six large industrial groups		0.50	
		(1.38)	
Herfindahl index			0.29
			(3.03)***
(Herfindahl index)^2			-0.36
			(-2.36)**
Herfindahl index×dummy for the six large industrial groups			-0.46
			(-3.23)***
(Herfindahl index)^2×dummy for the six large industrial groups			0.80
			(4.83)***
Adjusted R-squared	0.69	0.69	0.69
Number of observations	233	233	233

1. These regressions are estimated by the one-way fixed effect model (with firm dummy variables).

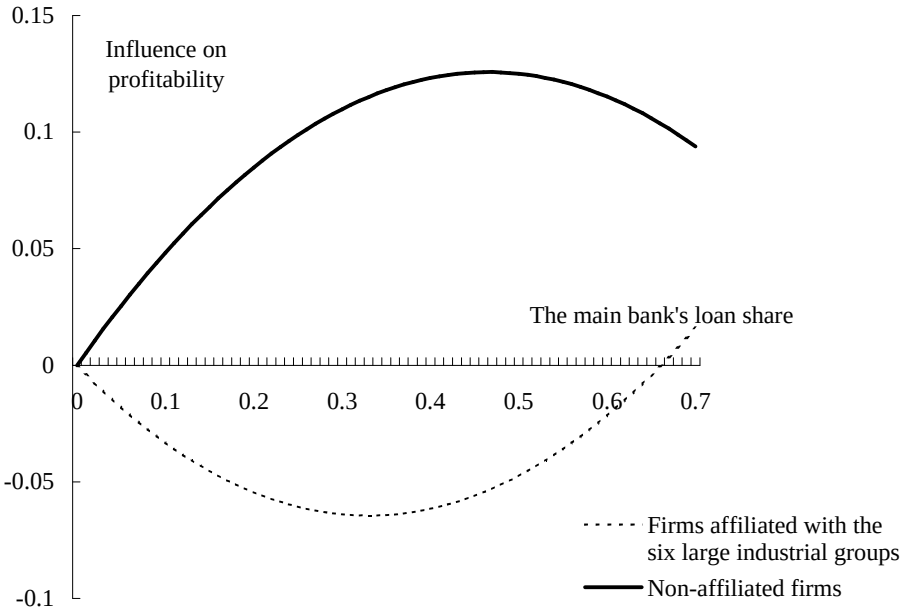
2. t-statistics in parentheses. "***", "**" and "*" indicate statistical significance at the 1, 5, and 10 per cent level respectively.

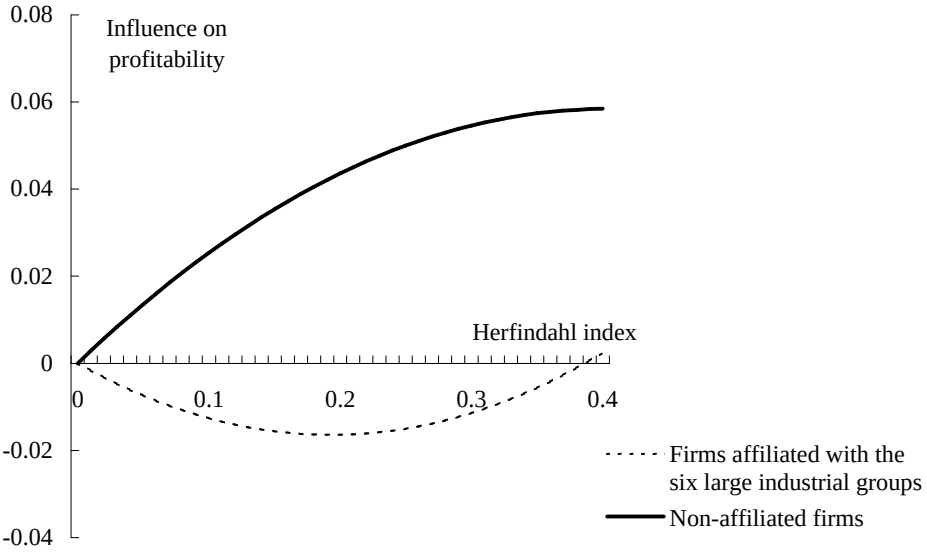
3. Heteroskedasticity consistent estimates of standard errors by White (1980) are used to calculate the t-statistics for regressions.

Figure 3.4 shows the non-linear relationship between profitability and lending concentration for the affiliated firms and the non-affiliated ones. At normal levels of these variables (i.e. in the neighbourhood of the average), the relationship is positive for the non-affiliated firms while negative for the affiliated ones. Thus, close banking relationships within these bank-centred corporate groups appear to have been costly already in the late 1970s.

This evidence is thus compatible with those past studies that found that main bank relations within financial corporate groups did not work very well even before the 1980s. It does not imply, however, that close banking relationships in general (measured by lending concentration, for example) were not beneficial for borrowers in the 1970s. Our findings show that such relationships were really advantageous, especially for firms without access to the corporate bond market or not belonging to one of the large industrial groups.

Figure 3.4 A non-linear relationship between profitability and lending concentration: Differences between firms affiliated with the large six industrial groups and non-affiliated ones in the late 1970s





3.6 Summary and conclusion

By using a sample of selected Japanese companies in the electrical machinery industry, we have examined bank relationships and firm performance[19]. We find weak evidence that firms with stronger ties with banks might have had higher profitability in the late 1970s. This relationship was more significant among firms that had no access to the public bond market or that were not affiliated with the six large corporate groups. Thus, close bank relationships seem to have been particularly beneficial for them during that period. These firms, however, clearly did worse in the late 1990s, although they still paid marginally lower interest costs than firms with weaker bank relationships in the same period.

We also find that "monitoring benefits" seem to have disappeared by the late 1990s, since firms with higher growth potential (presumably a feature calling for close bank monitoring), tended to have lower bank dependence in recent years. This is further evidence for the diminishing benefits of recent bank-borrower relationships.

[19] Since our results are based solely on one particular industry, which grew very rapidly over the past decades, their implication for other industries or the whole business sector in Japan should be left open.

One explanation for these various changes in the influence of banking relationships is that these relationships have gradually matured and entered into a new stage. In this stage, banks can no longer create additional value by monitoring mature firms which suffer from fewer agency problems. Such changes might have been be further promoted by the financial liberalisation of the 1980s, which reduced the overall benefits that banks could obtain in their lending activities.

In addition, the burst of the bubble economy in the early 1990s worsened the quality of bank assets and severely affected the process of financial intermediation. Banks could no longer afford to provide intensive monitoring to their clients, who thus derived much less benefit from close bank relationships. This view is strongly supported by the evidence that firms whose main bank was weakly capitalised did worse in the late 1990s. In the following chapter, we will examine in detail what happened to Japanese banks during the past two decades.

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