

# Ownership structure and firm profitability in the Japanese keiretsu

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## Abstract

Financial institutions within Japan's corporate groups, called keiretsu, are both lenders and shareholders of member firms. Current literature has failed to produce unanimity about how ownership of firms by financial institutions affects firm profitability. Competing theories propose that banks use this position as shareholder either to promote firm profitability, or to increase lending to generate interest revenue. This paper uses panel data to show that bank ownership results in profit non-maximization if the bank simultaneously holds debt in the firm. It is also shown that, despite continuing financial deregulation, the significance of ownership integration within the keiretsu has remained unchanged.

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## 1. Introduction

The unique ownership structure within the Japanese keiretsu has been the subject of a great volume of literature. Despite its abundance, this literature has failed to produce unanimity about the relationship between keiretsu ownership structure and its effects on member firm performance. Proposed theories generally take one of two perspectives. The first states that ownership ties between keiretsu firms and a Main Bank (as well as inter-firm

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ownership ties) serve to increase the level of monitoring of a firm's management. This, in addition to providing member firms with greater access to capital than non-member firms, should result in a positive relationship between ownership concentration and profitability. The opposing argument states that the Main Bank relationship encourages firms to "overborrow", which increases interest revenue for banks but hinders firm performance. Banks may also use their shareholding position to pressure firms to maximize sales as opposed to maximizing profits, which is intended to increase returns on loans. If the latter argument prevails, then we should observe a negative relationship between the degree of ownership and profitability.

This paper attempts to answer this question by examining the relationship between ownership structure of keiretsu firms and profitability. Specifically, does the role of the Main Bank as a shareholder dominate its role as a lender, or would the bank rather sacrifice firm profitability for an increase in interest revenue? If the latter is true, this implies that the bank uses its position as a shareholder to manipulate management in ways that are inconsistent with share price maximization. We try to explain what might justify such behavior, despite the fact that banks are shareholders and thus should want to see share price maximized. This paper will also estimate how the relationship between bank ownership and firm profitability has changed during the 1990s in light of deregulation measures within Japanese financial markets.

The remainder of this paper is as follows. Section 2 will present a brief history of the keiretsu and show how these corporate groups have formed from the predecessor zaibatsu. Section 3 examines the differences between the United States and Japan in terms of information structures within the firm. It will be shown that much of the difference between these two systems can be credited to the unique ownership structure within the keiretsu, which is examined in detail in Section 4. Section 5 examines the effects of ownership integration between banks and firms, and outlines the dual role of the Main Bank as both a lender and as a shareholder. The existence of these two distinct roles creates ambiguity about the effect between the Main Bank relationship and profitability, which is modeled in Section 6. This modeled relationship will be empirically tested in Section 7, and we will examine financial market deregulation in Japan since 1984 and test its effect on the importance of the Main Bank relationship in Section 8. Finally, Section 9 will present a conclusion and propose potential topics for future study.

## **2. Formation of the keiretsu**

### *2.1. The zaibatsu*

The zaibatsu were large, family controlled conglomerates that dominated the prewar Japanese economy, controlling over 25% of all capital assets. There were 14 main zaibatsu families, but the largest and most prosperous were Mitsui, Mitsubishi, Sumitomo and Yasuda.<sup>1</sup>

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<sup>1</sup> The remaining 10 zaibatsu were Ayukawa, Asano, Furukawa, Kawasaki, Matsushita, Nakajima, Nomura, Okochi, Okura and Shibusawa. Mitsui, Mitsubishi, Sumitomo and Yasuda continued through the post-war keiretsu, although the Yasuda group name was changed to the Fuyo group.

Table 1  
Distribution of shareholdings in Japan and the U.S., 1950 and 1990

Owner	1950 ownership, Japan (%)	1990 ownership, Japan (%)	1990 ownership, U.S. (%)
Individuals	69.1	22.4	50.2
Financial institutions	9.9	48.0	30.4
Non-financial corporations	5.6	24.9	14.1
Foreign	1.2	4.0	5.4

Source: [Prowse \(1995\)](#).

At the center of the zaibatsu was a holding company, which held shares of industrial companies, especially companies in the heavy industries. The involvement of the zaibatsu in heavy industries allowed these conglomerates to grow substantially during World War II, as the Japanese army depended heavily on zaibatsu produced equipment and supplies. It is for this reason the Supreme Commander of the Allied Powers (SCAP) viewed the zaibatsu as a force perpetuating war, and moved to strip power from the founding families of the zaibatsu. The Holding Companies Liquidation Commission (HCLC) acquired control of zaibatsu assets and divested ownership of the zaibatsu firms, redistributing shares to private owners, giving preference to firm employees and local residents.<sup>2</sup> As a result of this redistribution, individual shareholding reached a high of nearly 70% in 1950 (see [Table 1](#)). In following years, heavily reformed firms tended to perform worse than their industry peers that had not undergone a similar redistribution of shares to private owners. One possible explanation is that the diffusion of ownership reduced the incentive of any given shareholder to monitor managers of a firm; a hypothesis that has been supported empirically by [Yafeh \(1995\)](#).

## 2.2. Emergence of the keiretsu

In 1949 the Tokyo Stock Exchange was allowed to reopen, and throughout the early 1950s individuals resold their newly acquired shares back to firms and financial institutions. By the mid-1950s individual shareholding had returned to its prewar level, and the keiretsu began to emerge with the formation of the keiretsu president's clubs. Ownership of shares of keiretsu firms has continued to re-concentrate in the hands of financial institutions and other member firms, as [Table 1](#) illustrates.<sup>3</sup>

Notice the differences in the level of ownership between the United States and Japan, much of which can be attributed to differences in regulations. United States' banks are prohibited from holding shares on their accounts by the Glass-Steagall Act of 1933. No such restrictions are in place in Japan, although shareholding is regulated by the Antimonopoly Act, which prohibits holding companies in Japan. A holding company is defined as a company whose principal business is to control the business activities of a Japanese company by means of holding stock.<sup>4</sup> According to this definition, financial

<sup>2</sup> For more on the directives and ordinances of SCAP and the HCLC see [Iyori and Uesugi \(1994\)](#).

<sup>3</sup> Government held 7% of equity in 1990. However, 1950 governmental holdings are not available, so the figure has been omitted.

<sup>4</sup> Interestingly, there have been cases where banks have granted loans to failing firms in exchange for shares, and as a result of this increase in shareholding the bank was charged with violation of the Act (1961, Daiwa).

institutions were required to limit their holdings of non-financial firms to 5% of outstanding shares. In 1953, the 5% holding limit was relaxed to 10%, and by the 1970s banks grew to be among the top three stockholders of companies listed on the Tokyo Stock Exchange. The shareholding ceiling for financial institutions was thus changed back to 5% in 1977, and banks were given 10 years to comply. Since the deadline in 1987, banks generally have held the 5% maximum amount. However, it should be noted that these shareholding ceilings do not exist for non-financial institutions, and as a result we see high levels of cross shareholding between non-financial firms, which will be discussed further in Section 3.

### 3. Information and ownership: the U.S. and Japan compared

A more detailed comparison between the Japanese keiretsu system and the system present in the United States will highlight the significance of the issues discussed above. There are pronounced differences in corporate governance, ownership structure, regulation and incentive structures between these countries.

#### 3.1. Ownership and debt

As Table 1 illustrates, the level of shareholding among financial and non-financial institutions is quite elevated in Japan. However, these data do not provide a complete picture of ownership structure and concentration, so the difference between the U.S. and Japan may be more significant than the figures in Table 1 imply. A large percentage of shares held by U.S. financial institutions are not held on the institutions' own accounts. Instead, the majority shares held by U.S. institutions are held by *institutional agents*, such as pension funds or mutual funds, in which case the institution may not take an active role in the governance of the firm. In contrast to this, as Table 2 shows, Japanese institutions tend to hold a great deal of stock on their own account, giving them greater incentive to participate in monitoring and in the governance of firms.

We see similar trends in the data concerning ownership concentration, shown in Table 3. Concentration in this case is measured by summing the total shares held by the largest five shareholders of each firm.

One possible explanation for the high level of ownership concentration in Japan is that the mean firm size (in terms of both total assets and market value of equity) is much smaller than it is in the United States. The limited size of Japanese firms is due to the popularity of maintaining contracts with other firms as opposed to increasing firm size through mergers

Table 2  
Institutional shareholding, 1990

Owner	United States (%)	Japan (%)
Financial institutions as owners	2.0	38.5
Financial institutions as agents	55–62	9.5
Non-financial institutions	7.0	24.9

Source: Prowse (1995).

Table 3  
Shares owned by largest five shareholders, 1990

Ownership concentration	United States (%)	Japan (%)
Mean	25.4	33.1
Minimum	1.3	10.9
Maximum	87.1	85.0
Standard deviation	16.0	13.8
Mean firm size <sup>a</sup>	3505	1835
Mean firm size <sup>b</sup>	1287	811

Source: Prowse (1992).

<sup>a</sup> Measured by total assets.

<sup>b</sup> Measured by market value of equity.

or takeovers. A simple example of this is a comparison of Toyota and General Motors.<sup>5</sup> However, Prowse (1992) finds that differences in firm size are capable of explaining only about 15% of difference in concentration, determined by regressing ownership concentration on the size of the firm for U.S. and Japanese data.

As previously stated, much of the divergence between the United States' and Japanese ownership structures can be attributed to differences in regulations. This tends to be true in the case of debt-holding as well. In the United States, banks' lending is limited to a maximum of 15% of total capital to one borrower, while in Japan the limit is 30%. As a result, high levels of lending and ownership integration are frequent in Japan, unlike in the United States. In fact, Prowse (1990) showed that for 40% of Japanese manufacturing firms, the largest debt holder is also the largest shareholder.<sup>6</sup> The U.S. case is strikingly different. There are very few cases in the United States where the largest shareholder holds any debt, and if debt is held, it is of a miniscule amount.<sup>7</sup> This highlights the importance of the Japanese bank as an owner of both debt and equity, implying an integral role of banks in the corporate governance system in Japan, while their American counterparts are generally not significant monitors of management. This implication has been supported by recent literature, and will be detailed in Section 4.

#### 4. Ownership integration in the keiretsu

The distinction between vertically integrated firms and horizontally integrated firms is important. Vertical integration occurs when Firm A owns shares of Firms X, Y and Z, when Firms X, Y and Z produce input factors used by Firm A. Horizontal integration occurs when Firm A owns shares of Firm B, and both Firms A and B produce the same (or similar) products, requiring the same input factors, and sold on the market as a finished good.

<sup>5</sup> In 1997, General Motors had earnings of approximately \$6.7 billion, with Toyota at about \$2.5 billion (at the 1997 exchange rate), a ratio of 2.5:1. However, General motors employed some 650,000 people to Toyota's 68,000, a ratio of 9.5:1.

<sup>6</sup> On average the largest debt-holder in Japan holds 25% of a firm's outstanding debt and 5% of the firm's outstanding equity. The largest five debt-holders hold 50% and 20% of a firm's debt and equity, respectively.

<sup>7</sup> Clyde (1989), cited in Prowse (1995).

There are several theories concerning the motivation and effects of ownership ties for both vertically and horizontally integrated firms. Aoki (1984, 1990) and Sheard (1991) present an anti-takeover theory; that ownership integration serves to insulate a firm from external takeover attempts, which allows management to take a long-term view on investments. The argument underlying the anti-takeover theory is that member firms are less willing to sell their shares of other member firms because this would weaken their relationship with the keiretsu. It is also believed that shareholding ties between firms exert considerable influence on how member firms produce and how they are managed. A firm experiences a great deal of monitoring from member firms with which it shares a trading relationship (Flath, 1993). Flath illustrates how horizontal integration through shareholding can lead to a type of cartelization within the keiretsu, the effect of which is reduced output and higher prices. Flath (1996) also shows that a firm may hold shares of other firms in order to establish leverage over trades made with such partner firms. If the firm feels that its partner has shirked in quality or price of the product, it has the option of divesting shares of the partner firm. Thus, opportunistic behavior is monitored through cross shareholding ties within keiretsu groups.

Additional theories propose that the advantages of shareholding integration extend beyond a mechanism of monitoring partner firms. Fransman (1990) proposes that Japanese firms are part of a unique and dynamic system of information sharing, particularly within the electronics and computer industries. Suzuki (1993) supports this empirically, showing that vertical integration in particular promotes spillover of research and development investments. Horiuchi (1990) shows that firms in the keiretsu use horizontal shareholding ties to form an organization to collect and distribute industrial and technical information to its members.

Although most of this literature points toward a positive relationship between ownership integration and performance for non-financial firms, these theories overlook the importance of the Main Bank within the keiretsu. The presence of horizontal and vertical shareholding integration between non-financial firms is a differentiating mark between Japan and most western economies, but the importance of this shareholding integration in terms of profitability may be overstated. Yamamura (1979) and Imai (1990) have gone so far as to describe the keiretsu cross shareholding as “symbolic”, serving only to signal the existence of a business relationship between firms. The level of shareholding integration is not significant, as long as this level exceeds some small threshold value. This idea is supported historically, as it was the Main Bank (not firms’ desire to enhance performance) which encouraged shareholding integration between non-financial firms. It therefore seems reasonable to conclude that the effect of cross shareholding integration is not as significant as that of the relationship between a firm and the Main Bank, in terms of the performance of a keiretsu affiliate firm.

## **5. The Main Bank and the keiretsu firm**

The Main Bank in the keiretsu has the unique position of being a shareholder of a firm as well as lending to that firm. As a lender to a firm, the Main Bank wishes only to maximize interest revenue while minimizing the occurrence of loan default. This means that the bank

would like to see the firm borrowing heavily from the bank, thereby increasing the firm's interest expenditure. However, as a shareholder of a firm, the Main Bank may wish the firm to maximize revenue, net of interest expenditure. Thus, the bank as a shareholder wants the firm to minimize interest expenditure in order to maximize profits. In both cases, the Main Bank has incentive to monitor the firm. As a holder of debt, monitoring will decrease the probability of loan default. As a shareholder, monitoring will ensure that management behaves in a manner consistent with maximization of the firm's profit maximization and share price.

### *5.1. The Main Bank as a shareholder*

As shareholding concentration increases, the Main Bank has an increased incentive (and ability) to monitor management of firms. This incentive to monitor is compounded when, as is the case in Japan, shareholders are also debt holders (Prowse, 1995). Thus, as ownership concentration of firms increases (i.e. reduce the number of shareholders, holding the number of outstanding shares fixed), monitoring should be intensified. Prowse (1992) estimates ownership concentration among firms in the U.S. and Japan, and found that independent firms in Japan and U.S. firms have similar ownership concentration levels. For example, the largest 10 shareholders of an independent Japanese firm hold approximately the same percentage of outstanding shares as their U.S. counterparts. Keiretsu firms on the other hand were statistically different in ownership concentration, with levels over 30% greater than U.S. firms, a difference significant at a 1% level. Prowse hypothesizes that if ownership concentration is a proxy for level of monitoring, then profit stability should be positively related to the level of ownership concentration. The results between variation in profits and ownership concentration for independent firms are statistically significant, but the results for keiretsu firms were not statistically significant. One possible explanation is that the convoluted nature of the keiretsu may obscure the true means of monitoring managers. There may be monitoring forces exerted by member firms and the Main Bank that are independent of the level of ownership concentration. Also, as Leathers and Raines (1994) point out, the importance of the Main Bank as a monitor may be decreasing as the Japanese financial markets are deregulated and firms are allowed to raise capital more easily through market mechanisms. This model will be revisited later in this paper.

Although the Main Bank plays the role of a monitor within the keiretsu, a bank will not typically interfere with management or operation of the firm if profits are healthy. However, if the firm encounters financial problems, the bank will intervene and offer assistance while allowing the firm to continue operation. Aoki (1990) shows that this increases job security and profitability of the monitored firm, since only under extreme circumstances will a firm be allowed to fail. As a result, firms are capable of guaranteeing lifetime employment if they enjoy a strong relationship with a Main Bank. Also, as stated in Section 2, firms gain stability through Main Bank relationships by avoiding interest rate risk and easing liquidity problems (Horiuchi, Packer, & Fukuda, 1988). The Main Bank can therefore serve as a mechanism for risk sharing, and these authors propose that a firm should thus move to strengthen this relationship with the anticipation of financial distress. This is of course consistent with Prowse's theory that there exists a negative relationship between the Main Bank relationship and profit volatility.

Elevated levels of bank ownership have also been shown to reduce the problems of raising capital faced by keiretsu firms. Specifically, since keiretsu firms are not liquidity constrained like their independent counterparts, the keiretsu firms maintain a higher level of investment. Hoshi (1988) show that keiretsu firms maintain higher levels of investment than their independent counterparts do, at a statistically significant level. This implies that the use of the Main Bank as a source of capital can effectively increase the period over which investment return is expected. For example, a keiretsu firm will be more inclined to take a long-term approach to investment (in light of the increased availability of funds) than its non-keiretsu counterpart, which creates downward pressure on short-term profitability for keiretsu firms.

### 5.2. *The Main Bank as a lender*

A bank has an incentive to maintain its Main Bank relationship with a firm, despite the excess burden of intervention in the event of firm failure (Aoki, Patrick, & Sheard, 1994). If a bank liquidates a firm prematurely, it loses all possible future returns (in the form of interest revenue) should the firm recover. Although this is also true for lending institutions in western systems, Japanese banks have historically been more willing to incur the costs associated with assisting firms. Aoki (1988) claims that this is the result of the Main Bank's ability to induce overborrowing by firms, thereby increasing the value of expected future revenues generated by loans to the firm. Aoki states that a Main Bank can use its position as a shareholder to influence managers to borrow at a debt to equity ratio that is inconsistent with share price maximization. As stated earlier, this creates tension between the shareholder and lender functions of the Main Bank's objective to maximize profit.

### 5.3. *Firm profitability under the Main Bank*

What are the implications of the Main Bank relationship from the point of view of the firm, and how does this elevated level of investment affect profits? To answer this question, consider a model consisting only of the Main Bank and the firm. The firm has the objective of maximizing profits over a time interval of length  $T$ . We have evidence that lengthened time horizons on investments, increased access to capital through borrowing, and the longevity of the expected period of employment are all products of the Main Bank relationship. Using ownership concentration as a proxy for the strength of the Main Bank relationship, we can express the objective period of the firm as a function of ownership concentration. Thus, the relationship between ownership concentration and profitability will not be apparent unless the time interval is sufficiently long. This is consistent with the previous empirical work of Hoshi (1990) who show that keiretsu firms take a more long-term perspective on investment than independent firms do. The keiretsu firm, given the extension of the objective period, is willing to sacrifice current period profits for later period returns. If we let  $t^*$  denote the time at which the return to a keiretsu firm's investment catches up to that of an independent firm, then for  $t < t^*$ , keiretsu profits will be lower than the independent firm's profit. However, if  $t > t^*$ , then the keiretsu firm's level of profit will exceed that of its independent counterpart. It further seems reasonable to assume that ownership concentration and the Main Bank relationship increase the objective period  $T$  at



a diminishing rate. This is consistent with the notion presented by Imai (1990) that there may be a threshold value of shareholding, and once that threshold is surpassed, the returns to further ownership would be less significant.

It is therefore not clear what the relationship between ownership concentration and profits will be at any time  $t$ , given that the threshold value of ownership concentration is not known. For example, if shares of Firm A are owned in a more concentrated manner than shares of Firm B, the above model implies that Firm A will have a more long-term time horizon on investment. However, if both firms are well over the threshold value of ownership concentration, these two firms might have approximately the same objective periods, despite the difference in shareholding concentration. It thus becomes implicitly important to examine the effect of ownership concentration on profitability over an extended period of time, as a cross sectional sample will not capture the above time specific effects. This could be responsible for the lack of statistically significant results in the previous work done by Prowse (1992).

We have shown that ownership of a firm by the Main Bank may influence a firm's profitability in a variety of ways. Table 4 summarizes these points.

## 6. An empirical model of profitability

How do the existence of lifetime employment and horizontal incentive structures, in conjunction with the pressures exerted by the Main Bank, affect profitability of a keiretsu firm? Section 3 showed that investment strategy and scope of management among keiretsu firms is likely to take a more long-term perspective than management in the United States may generally take. As Sections 4 and 5 have illustrated, this long-term perspective is a symptom of the Main Bank relationship, and to a lesser extent shareholding integration between member firms. We have also shown that the Main Bank's incentives have an ambiguous effect on profitability since its role as a shareholder and as a debt-holder work in opposite directions.

### 6.1. Previous empirical work

In order to test the effect of these variables on profitability, we develop a model based on previous work done by Prowse (1992). Prowse presents a model that attempts

Table 4  
Summary of the effects of the Main Bank

Effect on profitability	Reason
Positive	<ul style="list-style-type: none"> <li>• Increases availability of capital, which leads to high levels of investment.</li> <li>• Acts as a monitor, increasing the probability of positive return on investment and reducing the probability of loan default.</li> <li>• Offers assistance in the event of financial distress, which limits the probability of firm failure.</li> </ul>
Negative	<ul style="list-style-type: none"> <li>• Induces over-borrowing by a firm in order to boost interest revenue.</li> <li>• The long-term nature of firm investment may reduce short-term profitability.</li> </ul>

to capture all of the above components of the keiretsu, and tests the relationship between ownership concentration and profitability (measured as return on assets). Return on assets was measured as the mean value of annual net profit, as a percentage of the book value of equity over the period 1979–1984. Ownership concentration was proxied using the total percentage of outstanding shares held by the largest five shareholders during 1984. Other independent variables included in Prowse's model were expenditure on advertising, research and development expenditure, total assets (used as a scaling factor) and capital expenditure. Thus, the equation tested by Prowse for profitability of firm  $i$  at time  $t$  is represented by the following:

$$\pi_t^i = \beta_0 + \beta_1 OC_t^i + \beta_2 CAP_t^i + \beta_3 ADV_t^i + \beta_4 R\&D_t^i + \beta_5 ASSET_t^i \quad (1)$$

where  $\pi_t^i$  is net profit for firm  $i$  as a percentage of the book value of equity,  $OC_t^i$  is ownership concentration,  $CAP_t^i$  is ratio of capital expenditure to total sales,  $ADV_t^i$  is ratio of advertisement expenditure to total sales,  $R\&D_t^i$  is ratio of research and development expenditure to total sales,  $ASSET_t^i$  is value of total assets.

There are several problems with Eq. (1) and with the data used to estimate the relationship between the above independent variables and profitability, the foremost of which is the oversight of time specific phenomena. Prowse used a 5-year panel set of data (1979–1984) for profitability, reduced this panel into an average level of profitability for the entire period, and then regressed this average as a function of ownership in 1984.<sup>8</sup> As Section 2.2 stated, the regulation on shareholding by financial institutions was changed from 10% to 5% in 1977, and banks were given until 1987 to comply. Thus, use of shareholding data from 1984 are problematic, as financial institutions were actively divesting shares of non-financial firms during this 10-year period in order to meet the approaching 5% restriction deadline. The level of ownership concentration therefore may not accurately reflect the bank's incentive or ability to monitor a firm, but may merely reflect the bank's effort to comply with the new restriction on shareholding. Thus, the results of the regression may be quite different if the data used are from the post-1987 period. The reduction of a panel data set into an average is also problematic. We have suggested that keiretsu firms tend to forgo current period profits in exchange for later period growth. Reduction of a panel data set into an average measure of profitability will obscure this aspect of keiretsu firm profitability and limit the estimation ability of the model.

Prowse also does not segregate firms into industries (although he samples firms from many industries), so his results could be reflecting some industry-specific forces which drive profits. For example, the period sampled by Prowse was a period of intense protectionism by the American automobile industry, resulting in the Japanese voluntarily restraining exports (VERs). This certainly affected Japanese automobile manufacturers'

<sup>8</sup> Taking the average return on assets from a period prior to the observed value of ownership concentration is not theoretically sound, as profits in period  $t$  are a function of ownership concentration in the current period. Also, a 5-year period may not be long enough to capture the extended nature of the investment time horizon for keiretsu firms.

profitability, but is not captured in Eq. (1). The desegregation of industries into one set also makes the use of the variable ASSET as a scaling variable problematic. For example, the value of total assets should have a different relationship with profitability for textile and food processing firms than it will have for automobile firms. Thus, without separating the data set by industry, the model loses its ability to estimate a relationship between these independent variables and profitability.

A proxy for macroeconomic level variables, such as GDP growth and exchange rate fluctuation should also be included, as profits are procyclical. Prowse's sample includes industrial firms, many of which export (or import) a large percentage of products and are therefore vulnerable to variations in the exchange rate. Again, to cite the automobile industry, during the period of VERs, many Japanese auto manufacturers transplanted production facilities to the United States. This means that both production expenses and sales would be transacted in dollars, but recorded in yen. It is therefore imperative to include the exchange rate in the model. However, the level of overseas production is difficult to measure, as data on the location of production, and the cost of imported labor, are not available for the majority of firms within the keiretsu. Thus, although the inclusion of the real effective exchange rate will partially capture internationalization of production costs, there will still be some exchange rate vulnerability not captured. This will be discussed further in the following section.

## 6.2. The regression model

In light of the shortcomings of Prowse's model, we use an extension of Eq. (1) to test the relationship between profitability and ownership concentration. Following previous work by Flath (1993), we use operating profit as a percentage of sales to proxy for profitability. For firm  $i$  at time  $t$ , the model of profitability takes the following form:

$$\pi_t^i = \beta_0 + \beta_1 \text{OCF}_t^i + \beta_2 \text{OCNF}_t^i + \beta_3 \Delta \text{GDPJ} + \beta_4 \Delta \text{GDPUS} + \beta_5 \text{R\&D}_t^i + \beta_6 \text{XR}_t \quad (2)$$

where  $\pi_t^i$  is operating profit, as a percentage of sales,  $\text{OCF}_t^i$  is ownership concentration of shares held by financial institutions,  $\text{OCNF}_t^i$  is ownership concentration of shares held by non-financial institutions,  $\Delta \text{GDPJ}$  is change in the GDP of Japan,  $\Delta \text{GDPUS}$  is change in the GDP of the United States,  $\text{R\&D}_t^i$  is expenditure in research and development, as a percentage of sales,  $\text{XR}_t$  is real effective exchange rate at time  $t$ .

The motivation behind the inclusion of GDPUS is to proxy for the general economic conditions of countries with which Japan shares a trading relationship. The U.S. is Japan's largest trading partner, and a positive relationship is therefore expected between this variable and firm profitability. Although there is theoretical justification for including a variable such as expenditure on advertising, these data are not immediately available.<sup>9</sup> The sign of the exchange rate variable is ambiguous, as firms produce and generate sales in

<sup>9</sup> Although data are not available for all of the variables in Eq. (2), the lack of significant results in Prowse's regressions justifies the exclusion such variables.

foreign currencies. As outlined in the previous section, data on production expenditure in foreign currencies are not available. Thus, calculation of net profit as a percentage of sales essentially becomes a ratio of exchange rate vulnerability due to international production to vulnerability due to international sales.<sup>10</sup> This will be examined at a later point in this paper. All other signs should be positive.

### 6.3. Data

Panel data were collected for a period from Japanese fiscal year 1987 to 1998 for 73 industrial firms identified as sharing a relationship with a keiretsu group, irrespective of representation in a president's club.<sup>11</sup> Selection of firms was limited to the electronics and automobile industries. The motivation behind this industry specific sampling is based on the fact that these industries are comprised of downstream firms which are more apt to realize benefits from research and development spillover and input factor price bargaining within the keiretsu. For example, a firm in the glass and ceramic industry requires only raw materials and labor for production. On the other hand, production of an automobile requires glass, rubber, plastics, steel, and many other input factors that are outputs of other firms. Thus, the significance of inter-firm shareholding integration should be greater for these downstream firms, as they are relatively more able to manipulate the supply of inputs (see Section 4). All data concerning Japanese firms used for the following regression have been collected from the annual autumn issue of *The Japan Company Handbook*.<sup>12</sup> Exchange rate data and GDP data for Japan were collected from the Bank of Japan. The exchange rate is the real effective rate, with base year 1973. The United States GDP data were obtained from *The Economic Report of the President* from various years. Fig. 1 shows the average growth of these variables for all firms during the period sampled, where 1987 is equal to 100.

The ownership concentration variable is calculated using the holdings of the largest 10 shareholders of the firm, and is divided into financial and non-financial owners, which is consistent with Prowse. However, this ownership concentration variable is different than that used by Prowse, who simply summed the percentage of shares held by the largest five shareholders. Prowse's technique does not capture the level of concentrations among the top shareholders. For example, consider Firm A, whose top five shareholders each own 2% of outstanding shares, and Firm B, whose largest shareholder holds 9.9% and the other four of the top five shareholders each hold only 0.025%. Prowse would find that these firms have the same level of ownership concentration, but the latter firm's ownership concentration level is clearly higher than

<sup>10</sup> Operating profit is defined as sales less operating expenses. Thus, as a percentage of sales, we get the following:  $\pi = (\text{sales} - \text{operating expense})/\text{sales} = 1 - (\text{operating expense}/\text{sales})$ . Operating expense and sales are affected by exchange rate fluctuations at different rates. Inclusion of the effective exchange rate on the right side of the equation will not differentiate between these two aspects of the above ratio.

<sup>11</sup> Classification of a firm as a keiretsu member was taken from Kigyo Keiretsu Soran (Survey of Keiretsu Firms) (1996).

<sup>12</sup> Observations including major firm restructuring, liquidation of large amounts of assets, mergers or take-overs have been excluded from the data set, as the model is incapable of capturing these effects. Also, observations affected by a firm changing accounting techniques has been deleted from the data set.

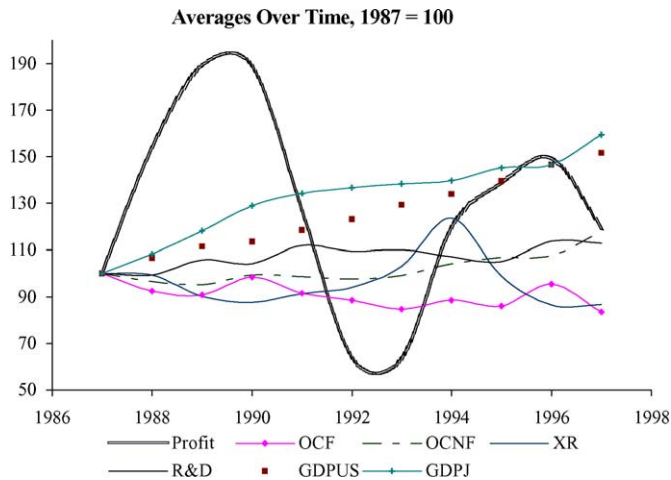


Fig. 1. Ownership structure and firm profitability in the Japanese keiretsu David Bernotas.

the former. A more effective way to capture the level of ownership concentration is not simply to sum the percentage of shares held by the largest shareholders, but to first square the percentage of shares held and then sum. Thus, Firm A from the previous example would have an ownership concentration of  $5(2^2)$ , or 20, while Firm B's ownership concentration value would equal  $9.9^2 + 4(0.025^2)$ , or 98.0125. This example illustrates how the elevated level of ownership concentration for Firm B is highlighted by squaring the percentage of shares held.

## 7. Estimating a relationship between ownership and profitability

### 7.1. Regression, Model 1

Table 5 presents the OLS regression results, where operating profit as a percentage of sales is the dependent variable. GDP data are all in percent changes, and R&D is a percentage of sales. Both present period and a one period lagged value expenditure on research and development are used, since the benefits of research and development cannot be realized in the current period. Further lagging of this variable would likely produce better results, but would do so sacrificing 1 year of data for each lag.<sup>13</sup>

The critical value for the *t*-statistic for 716 observations and a 5% two-sided level of significance is 1.960. The results above show that the signs of GDPJ and GDPUS are consistent with theory, and GDPJ is significant well beyond a 5% level. This affirms the fact that profits are procyclical. Also, the magnitude of the coefficients show that a 1%

<sup>13</sup> Regressions were also run lagging the ownership concentration variables, but no significant results were found.

Table 5  
Regression results, Model 1

Variable	Coefficient	<i>t</i> -statistic
<i>C</i>	5.839	2.160
$OCF_t^i$	−0.007	−3.011
$OCNF_t^i$	−0.00025	−1.023
$XR_t$	−0.0187	−0.838
GDPJ	16.421	3.090
GDPUS	1.864	0.119
$RD_t^i$	−15.740	−0.983
$RD_{t-1}^i$	1.729	0.109
Adj. $R^2$	0.03	
Observations	716	

change in the GDP of the U.S. affects profitability to a much lesser extent than a 1% increase in the GDP of Japan, which is plausible.

The effective exchange rate variable yielded a negative coefficient value, which implies that appreciation of the yen will increase profitability. Although this is inconsistent with theory, the *t*-statistic implies that the relationship between this variable and profits is essentially zero. This could be attributed to either a small dependence on export-generated sales, or a lack of exchange rate fluctuations. However, these data seem to suggest otherwise, as the average export ratio over the period sampled was 20.5%, and the yen fluctuated as much as 20% (see Fig. 1). Thus, the insignificance of this variable is likely due to the above-mentioned fact that many firms produce and sell in foreign currencies, so the appreciation in the yen works both for and against profitability.

The value of the  $RD_t^i$  coefficient is negative but not statistically significant. This is because current period investment in research and development is merely an expense, which clearly decreases profitability. The value of  $RD_{t-1}^i$  was positively signed as expected, but this variable was also statistically insignificant. A possible explanation is that the variable needs to be lagged more than one period, since a firm may be unable to realize the benefits of research and development expenditures in only one period. However, as mentioned earlier, further lagging of this variable would create greater loss of degrees of freedom and would only serve to limit the ability of the model to estimate a relationship between the other independent variables and profitability. A second possible explanation is related to previous work done by Flath (1993) who found that prospective growth (proxied by investment in R&D) can lead to increased levels of ownership by financial institutions. As the negative coefficient on the variable OCF suggests, increased levels of ownership by financial institutions has a negative effect on profitability. Thus, an increase in expenditure on research and development may lead to an increase in OCF, the negative effect of which may outweigh the positive effect of further research and development investment.

Inspection of the relationship between the two components of ownership structure and profitability yields some interesting results. The coefficient for the non-financial institution ownership concentration variable ( $OCNF_t^i$ ) is very small and negative, but is not statistically significant. In fact, Table 5 shows that the effect of non-financial ownership concentration is only about 3% that of financial ownership concentration. This is consistent

with the theory proposed in Section 4 that shareholding ties between trading partners may be only symbolic, and is thus of tertiary importance when compared to the Main Bank relationship. However, the insignificance of the coefficient value leads to the conclusion that using ownership data for only the largest 10 owners of a firm insufficiently captures the entirety of inter-firm integration. This is due to the fact that many non-financial institutions are not in the largest 10 shareholders of a firm and the coefficient value may thus be understated.

The value of the coefficient on ownership by a financial institution ( $OCF_t^i$ ) has a negative, statistically significant value. Thus, an increase in ownership concentration by financial institutions leads to a reduction in accounting profits. This is consistent with the theory that the Main Bank uses its position as a shareholder to induce overborrowing among client firms, thereby placing downward pressure on profits. However, these results do not distinguish between the role of the Main Bank as a debt-holder and its role as a shareholder. Table 5 shows that the net effect of ownership concentration by financial institutions is a reduction in profits, but do these data support the notion that these two roles of the Main Bank in fact work in opposite directions? If so, does the role of the Main Bank as a lender dominate its role as a shareholder, thereby resulting in the above negative relationship? Alternatively stated, can we empirically prove that in the absence of debt-holding, the Main Bank emulates the behavior of an individual investor thereby eliminating the problem of non-unanimity between shareholders and banks. Model 2 attempts to answer these questions.

## 7.2. Regression, Model 2

To answer the above questions, we allow the ownership concentration variable for financial institutions ( $OCF_t^i$ ) to interact with the level of debt (labeled  $BOR_t^i$ ) by multiplying these two variables.<sup>14</sup> If firm  $i$  has zero outstanding debt at time  $t$ , the value of  $BOR_t^i \times OCF_t^i$  will be zero, and the role of the Main Bank will be solely that of a shareholder. However, as firm  $i$  increases borrowing, the value of  $BOR_t^i$  increases, and the bank will have greater incentive to favor its role as a lender (in light of increased interest revenue). Thus, the sign of  $BOR_t^i \times OCF_t^i$  is expected to be negative. If financial institutions do not hold debt in a firm, the Main Bank will use its position as a shareholder simply to monitor firm  $i$ , which will increase profitability. The sign of  $OCF_t^i$  should therefore be positive. In essence, the interacted terms estimate the relationship between profitability and the Main Bank as a lender, while the variable  $OCF_t^i$  estimates the relationship between profitability and the Main Bank as a shareholder. Table 6 presents the regression results.

The coefficients on  $BOR_t^i$  and  $BOR_t^i \times OCF_t^i$  are negatively signed, as predicted. Thus, an increase in ownership of a firm by a financial institution leads to a reduction in accounting profits if the firm has outstanding debt. This is consistent with the argument that the returns to lending outweigh the returns to shareholding for the Main Bank. The coefficient value on the non-interacted variable for ownership concentration by a financial institution also has a negative sign. This is most likely due to the tendency of

<sup>14</sup> Debt is measured as the amount outstanding bank borrowing (at time  $t$ ) as a percentage of sales.

Table 6  
Regression results, Model 2

Variable	Coefficient	<i>t</i> -statistic
C	5.710	2.16
$OCF_t^i$	−0.0049	−1.60
$BOR_t^i \times OCF_t^i$	−0.0045	−0.49
$BOR_t^i$	−5.348	−4.30
$OCNF_t^i$	$−4.59 \times 10^{-5}$	−0.19
$XR_t$	−0.011	−0.53
GDPJ	16.625	3.23
GDPUS	6.389	0.42
$RD_t^i$	−20.795	−1.34
$RD_{t-1}^i$	1.807	0.12
Adj. $R^2$	0.09	
Observations	716	

the Main Bank to encourage firms to maximize sales as opposed to profitability.<sup>15</sup> However, notice that the value of the coefficient is very small, such that a 1% increase in  $OCF_t^i$  will increase profitability by only 0.005%. Also, recall that the calculation of  $OCF_t^i$  involved summing the square of shareholding percentages. Thus, the coefficient values do not show the effect of an increase in the shareholding by a financial institution.<sup>16</sup> The other independent variables maintained the same signs and relative values as Model 1.

### 7.3. Industry-specific effects of ownership concentration

As mentioned earlier, the data used here are for the automobile and electronics industries. These two industries are quite different in terms of input factor demand, research and development employment, and the dependence on international markets. For example, the period of voluntary export restraints resulted in a large number of transplant firms in the United States. The automobile industry is also very dependent on intermediate products such as steel, glass, and rubber. In contrast, the electronics industry is more dependent on investment in research and development than on these input factors, and thus is perhaps in a position to benefit more from information spillover within the keiretsu more than automobile firms. In order to determine if these industries react similarly to changes in the independent variables, separate regressions were run for each industry, and the results are presented in Table 7 (*t*-statistics are in parentheses).

The values of  $BOR_t^i$ ,  $RD_t^i$ ,  $XR_t$  and both GDP variables are signed as they were in Model 2. The value of  $OCF_t^i$  is positive for the automobile industry, as predicted, and significant well beyond a 5% level. This supports the theory that, in the absence of outstanding debt,

<sup>15</sup> Unfortunately, further examination of this question is beyond the scope of this paper.

<sup>16</sup> The separation of shareholding and ownership concentration is of paramount importance here. See Section 6.3.



Table 7  
Regression results

Variable	Electronics industry, 43 firms	Automobile industry, 30 firms
C	7.088 (1.85)	2.433 (0.93)
$OCF_t^i$	−0.012 (−2.98)	0.014 (3.43)
$BOR_t^i \times OCF_t^i$	0.012 (1.02)	−0.031 (−2.74)
$BOR_t^i$	−10.153 (−5.66)	−0.349 (−0.25)
$OCNF_t^i$	0.0008 (2.11)	$3.89 \times 10^{-5}$ (0.15)
$XR_t$	−0.001 (−0.04)	−0.016 (−0.73)
GDPJ	20.120 (2.64)	11.07 (2.20)
GDPUS	0.814 (0.04)	4.876 (0.33)
$RD_t^i$	−22.228 (−1.03)	−16.494 (−0.98)
$RD_{t-1}^i$	−23.508 (−1.10)	31.243 (1.87)
Adj. $R^2$	0.19	0.18
Observations	424	292

the Main Bank emulates the behavior of an individual investor and monitors a firm in order to maximize profits. However, the  $OCF_t^i$  coefficient for the electronics industry is negatively signed. This is consistent with Flath's (1993) findings that high growth industries, such as electronics, require higher levels of ownership concentration to maintain a given level of monitoring. Thus, an increase in ownership concentration of 1% would result in a greater effective increase in monitoring of an automobile firm than it would for an electronics firm. Also notice that the value of  $BOR_t^i \times OCF_t^i$  is positive for the electronics industry, which is inconsistent with the above theory, although this value is not statistically significant. This implies that the bank has increased incentive to monitor given higher levels of debt. This is again consistent with the notion from Flath (1993) that the electronics industry demands increased levels of monitoring due to its potential for high growth.

The value of  $OCNF_t^i$  has changed signs, and is now positive for both industries. However, the value for the automobile industry is very small and, as the  $t$ -statistic implies, it is highly probable that this value is actually zero. A possible explanation is that the existence of research and development spillovers, as examined in Section 4, are greater for the electronics industry as Suzuki (1993) and Horiuchi (1990) have stated. Similarly, the nature of the electronics industry could be responsible for the negatively signed value of the lagged research and development coefficient, as one period may not be sufficient time for realization of research and development investment in this industry. However, as mentioned earlier, further lagging is not practical due to the tremendous loss in degrees of freedom. Notice also that the value of the coefficient on ownership concentration by financial institutions is less than that of the coefficient for ownership concentration by non-financial institutions. This implies that the value of ownership integration between non-financial firms is greater than the value of ownership integration with the Main Bank. This works against the theory that inter-firm integration is merely symbolic. Again, this can only be explained through the unique nature of the electronics industry, and must be attributed to the level of research and development sharing within this industry.

## 8. The value of ownership in deregulated financial markets

Tables 5 and 6 present empirical support for the claim that the Main Bank favors its role as a lender at the expense of its role as a shareholder. There exists non-unanimity between individual shareholders' interests and the interests of banks, as Aoki (1988) has suggested, and the increase in interest revenue offsets the bank's loss due to share price non-maximization. Further, as the regression in Model 2 has shown, the amount of bank borrowing is negatively related to the level of profitability.

This is an important finding as the Main Bank has been credited with much of the success of keiretsu firms over the past fifty years. However, it should be noted that the above results do not necessarily imply that the Main Bank hinders the overall performance of the keiretsu firm, only the performance of accounting profits. Historically, the Main Bank has been at least partly responsible for fostering the rapid growth seen during the post-war Japanese economic expansion. The reduction of accounting profits (if this relationship extends to periods prior to the sample used here) can be viewed as a premium paid to banks by firms to insure against the risk of failure. During periods of capital scarcity, such as the immediate post-war era, keiretsu firms may have been more than willing to incur this premium cost in order to reap the benefits of the associated increased availability of capital. Thus, keiretsu firms may have considered the Main Bank to be a sort of safety net which provided member firms with a comparative advantage over non-member firms in terms of future growth and investment, as Section 5 has stated. However, do these conditions of capital scarcity continue to exist? If not, have keiretsu firms "outgrown" the need for the Main Bank?

### 8.1. *The Main Bank in deregulated financial markets*

The questions posed above are important to address, since the deregulation of Japan's financial markets has been rigorously pursued during the past 15 years. This movement began when the Yen/Dollar Committee<sup>17</sup> published a report in 1984 outlining the steps necessary to diminish the Japanese current account surplus by internationalizing and therefore appreciating the yen. Although many of the deregulatory measures are beyond the scope of this paper, some of the procedures employed to liberalize Japanese financial markets have had profound effects on keiretsu firms and the role of the Main Bank. The most noteworthy change was the 1984 liberalization of the international banking business and the international bond market. Access to the international bond market increased the availability of capital without increasing the need for additional collateral. From the point of view of the firm, this deregulation has provided direct access to capital (through issuance of bonds, for example) that was previously regulated or prohibited. A result of this was a reduction in the amount of bank borrowing balanced with an increase in the amount of new shares and bonds issued during the 15 years between 1984 and 1999 (see Table 8).<sup>18</sup> It is also significant to notice that foreign bond issues nearly doubled in the decade since the

<sup>17</sup> The Yen/Dollar committee was formed in 1983 and dissolved in 1988, after realization of the initial committee goals.

<sup>18</sup> These data are for non-financial firms only.

Table 8  
Percent share of outstanding debt

Debt	1984–1988 (average) (%)	1994–1998 (average) (%)
Bank borrowing	72.2	60.8
Securities issues	24.6	38.5
(Stocks)	8.2	23.1
(Foreign bonds)	8.1	13.9
(Domestic bonds)	3.9	1.5
(Other)	3.2	0.7

Data Source: Flow of Funds Accounts, Bank of Japan.

move to deregulate. This marks a significant change in the method of financing taken by Japanese firms.

Banks have been able to play a role in the issuance of securities, allowing them to derive sources of income other than interest revenue. Much of the adaptation of the bank is credited to the relaxation of the strict separation of the banking business from the securities industry. As a result of this relaxation, there has been a dramatic increase in the issuance of securities by what previously were institutions specialized in the banking industry. Thus, despite firms heading away from bank loans as a source of capital, the banks have remained surprisingly profitable throughout this era of deregulation. This is also visible in an international perspective, as Japanese banks began to establish subsidiaries abroad (especially in Europe) to underwrite bonds, a practice still prohibited in domestic markets.

The two industries sampled have behaved consistently with what the data above show. Fig. 2 shows aggregate bank borrowing as a percentage of aggregate sales for all firms within the data set. Notice the sharp reduction in the ratio of borrowing in the early periods of the sample.

The implications of the data presented in Table 8 are quite significant. As mentioned in Section 5, the Main Bank's incentive to monitor is positively correlated to the amount of the firm's debt held by the bank. Thus, as the level of bank borrowing declines, the incentive for banks to monitor the behavior of managers (in order to reduce the probability

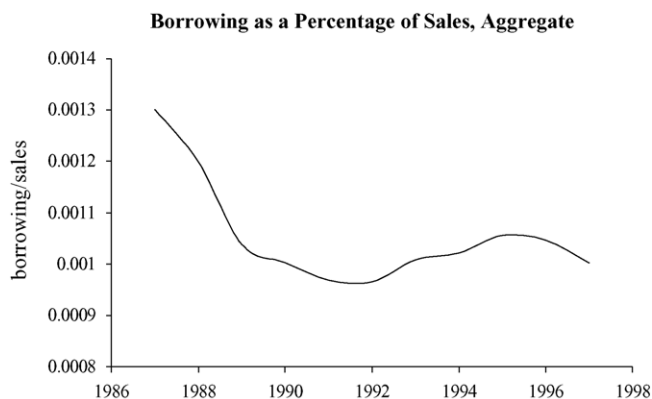


Fig. 2. Ownership structure and firm profitability in the Japanese keiretsu David Bernotas.

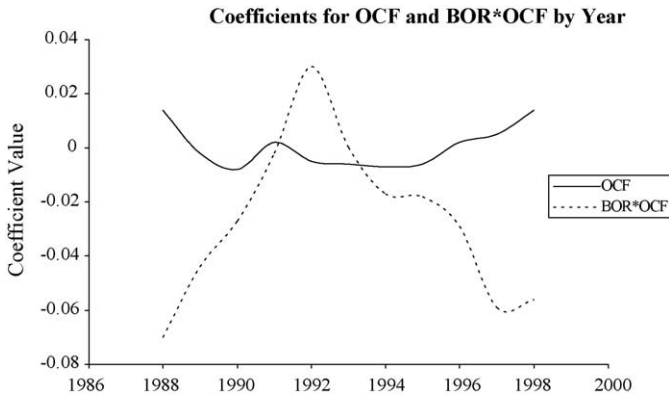


Fig. 3. Ownership structure and firm profitability in the Japanese keiretsu David Bernotas.

of loan failure) will diminish over time. Also, recall from Section 5 that the Main Bank has incentive to maintain its relationship with firms in order to preserve high levels of interest revenue generated through overborrowing by firms. If the level of borrowing from banks continues to decline, the value of a firm to the Main Bank (in terms of interest revenue) will be reduced. The Main Bank will therefore become less willing to extend relief to firms in the event of financial distress in deregulated financial markets.

### 8.2. Estimating the effect of deregulation

If the importance of the Main Bank's role has been decreasing in light of financial deregulation, then we should observe the coefficient values for the relationship between financial institution shareholding and profits approach zero over time. To test this hypothesis, separate regressions were run for each year of the sample and the coefficient values on  $OCF_t^i$  and  $BOR_t^i \times OCF_t^i$  are presented in Fig. 3 below.

The value of the coefficient on the non-interacted ownership concentration variable hovers around zero, and there is no apparent trend. The coefficient values for the interacted term also are lacking a trend, but given the lack of significance of the level of ownership concentration variable, this is not surprising. These results support the notion that a purely cross-sectional sampling will not effectively capture the effect of ownership concentration on profitability. Overall, it is not clear whether the deregulatory policies in Japan over the past 15 years have had any significant effect on the value of ownership integration between firms and the Main Bank within the keiretsu.

## 9. Conclusion

This paper has outlined the history and ownership structure of the Japanese keiretsu, and clarified the relationship between these components of the Japanese corporate groups and firm profitability. Previous literature had left the relationship between ownership concentration and profits essentially undetermined. The main source of ambiguity lies in

the dual role of the Main Bank as both a lender and a shareholder of firms. The former position leads the bank to encourage the firm to borrow in order to bolster interest revenue. The latter implies that the bank wants the firm to maximize profits net of interest expenditure. Thus, these two aspects of this dual role cannot be mutually maximized, leaving one to be maximized at the expense of the other.

Although Prowse (1992) had studied the relationship between ownership concentration and profitability within the keiretsu, no significant results were produced. It has been shown here that Prowse's results were likely due to the brevity of the period sampled, and if the data sampled span a long time period, significant results can be produced. The results presented here support the theory that the Main Bank tends to favor its role as a lender over that of a shareholder, and it uses its position as a shareholder to induce high levels of borrowing among firms. This is consistent with the notion presented by Aoki (1988) that the net benefit to the bank in the form of increased interest revenue offsets the loss incurred from a reduction in profitability and share price non-maximization. This theoretical underpinning is supported empirically in Section 7 of this paper, which shows that the effect of an increase in ownership concentration of a firm by a financial institution is a reduction of firm profitability.

This paper has also shown that the move to deregulate financial markets in Japan has had little effect on the significance of the Main Bank relationship. Although firms have been gaining access to alternative forms of capital (namely through international and domestic bond markets), the effect of ownership concentration seems to remain relatively unchanged. However, it has been shown here that a long sample period is necessary to capture the effects of ownership integration in the keiretsu, so the effect of deregulation may be visible as more data become available.

Future research on this topic should be continued in order to determine if the Main Bank relationship is indeed beginning to deteriorate. As mentioned above, this can be accomplished only through an extension of the time period of observation. Also, the question of whether the effect of ownership integration between non-financial firms is changing has not been examined here. As previously stated, shareholding data concerning inter-firm integration used here are insufficient to answer this question, so further collection of shareholding data is necessary.

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