Ownership Structure and Performance of Japanese Firms: Horizontal Keiretsu, Vertical Keiretsu, and Independents

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Financial economists have devoted substantial effort to describing and analyzing the governance structures of the Japanese keiretsu, or business groups, to explain how their features serve to improve group performance. The governance mechanisms described provide an informative contrast to the market based monitoring mechanisms of the Anglo-American governance system. In this paper we compare the performance of Japanese keiretsu member firms with that of independent Japanese firms, whose governance structure is more market based. We also compare the performance of different types of keiretsu group members. Two results emerge. First, we find no support for the hypothesis that the overall set of governance structures of keiretsu firms are more effective at maximizing shareholder wealth than are those of independents. In addition, we document significant performance differences among different types of group member firms.

Financial economists have been intrigued by the financial and corporate governance structures of the Japanese keiretsu, or business groups. They have sought first to describe these structures and then to analyze their impact on improving performance of group firms. According to these analyses, features such as the concentration of trade and financial interaction within the group facilitates monitoring, whereas cross-shareholding and interlocking directorates

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permit disciplinary action when necessary. Taken together, these features of keiretsu are often viewed as typifying the Japanese system of corporate governance. However, use of this system comes at a cost. By reinforcing cross-shareholding and other features that increase group control, keiretsu structure simultaneously weakens market-based mechanisms for managerial discipline. Therefore, in addition to the questions of whether and how the Japanese system works, this trade-off between group monitoring (the Japanese system) and market monitoring (the Anglo-American system) raises the question of which system works more efficiently. While we cannot claim to answer this question definitively, this paper presents relevant evidence by comparing performance (as measured by Tobin’s q) of keiretsu and non-keiretsu firms.

Our results do not support the hypothesis that the monitoring mechanisms of the keiretsu system do a better job of maximizing shareholder value than do the market-based systems of independent firms. Instead, they are consistent with the conclusion of Nakatani (1984) and of Caves and Uekusa (1976) that keiretsu firms behave as if they are pursuing goals other than shareholder wealth maximization. Based on our sample, ordinary keiretsu members are viewed less favorably by the market than are independent firms.

Beyond comparing keiretsu and non-keiretsu firms, this paper also distinguishes among firms by type of keiretsu and by their role within the group. Specifically, keiretsu groups come in two types: horizontal, otherwise known as “financial” keiretsu, which are conglomerate-like groups spanning a number of industries, and vertical keiretsu, which form production or distribution networks emanating from a core firm. Vertical keiretsu feature stronger control by the dominant firm and less of the reciprocal, symmetric arrangements of the horizontal keiretsu. Because of their differences in governance structure, we distinguish between horizontal and vertical keiretsu firms in our analysis. The results indicate that core (dominant) firms of vertical keiretsu perform better than ordinary keiretsu (and better than independents). Among ordinary keiretsu firms, members of vertical keiretsu fare even worse than horizontal keiretsu members.

Thus, by comparing Japanese firms with differing governance structures with each other, we reach two conclusions. First, we find no support for the hypothesis that the overall set of governance structures of keiretsu firms are more effective than those of independents at maximizing shareholder wealth. Second, by documenting performance differences between different types of keiretsu members we show that it can be important to differentiate between the various types of keiretsu in empirical analysis.

In Sec. 1 we describe and summarize the relevant analyses of keiretsu found in the literature. Section 2 describes the data used and our treatment of it. Basic results appear in Sec. 3. In Sec. 4 we consider possible alternative explanations for the results and Sec. 5 concludes.

1. Keiretsu and Their Governance: Literature Review

The literature describe keiretsu as groups of firms having intense internal trading and borrowing relationships as well as dense cross-shareholding and director exchanges. The nature and functioning of these relationships differ markedly between groups described as horizontal (“financial”) keiretsu and the so-called vertical (“production” or “distribution”) keiretsu. In form, a horizontal keiretsu (yokka) resembles a large, diversified conglomerate where relationships between firms necessitate little or no overlap among different industries [Berglöf and Perotti (1994)]. It is composed of relatively large firms from different industries with common ties to a powerful bank, and are united by cross-shareholding and trade relations. The largest horizontal keiretsu, known as the Six Big Industrial Groups, are led by Japan’s six largest city banks, referred to as main banks [Sakura, Mitsubishi, Sumitomo, Fuji, Sanwa, and Dai-Ichi Kangyo (DKB)]. In addition, a major trading company (shōsha) is associated with each of the Six Big Industrial Groups [Mitsui, Mitsubishi, Sumitomo, Nissho Iwai, Marubeni and C. Itoh].

A vertical keiretsu group (tate) is typically composed of firms according to lines of production or distribution. The production keiretsu is a collection of suppliers and assemblers under a single, large, end-product manufacturer. The distribution keiretsu branches from a large manufacturer through wholesalers and retailers. This type of relationship is also referred to as a pyramid keiretsu, since it is made up of one very large company, or lead member, and hundreds or thousands of smaller subservient companies.

Beyond describing keiretsu, the literature has sought to understand how their features contribute to the survival or efficiency of member firms. Particularly for the horizontal groups, researchers have identified monitoring and control functions for many of these structures [Lincoln, Gerlach, and Takahashi (1992)]. For example, it is postulated that the frequent interaction and information exchange generated by intense trading relations foster monitoring and serve

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1 However, we note that many authors contend that shareholder wealth maximization has never been the objective of the “typical” Japanese firm.

as an early warning system for managerial problems. Combined with cross-
shareholding between group members and interlocking directorates, this provides
an internal process for changing management that is less costly and disruptive
than external change in control [Kaplan and Minton (1994)]. Trading companies
in particular are well placed to monitor activities of member firms because they
act as intermediaries and guarantors of trade credit for many within-group
transactions [Miyashita and Russell (1994), Sheard (1989a)]. The role of the
group's lead bank as a key player in group monitoring and the enforcement
system has attracted particular attention [Berglöf and Perotti (1994)]. In its
role as chief lender to larger firms of the group, it serves as a monitor for
group performance, clearinghouse for information, and initiator of intervention
in the event of deficient performance [Kang and Shivdasani (1995)]. The latter
is facilitated by its equity positions and representation on corporate boards
[Lincoln, Gerlach, and Takahashi (1992)]. When intervention does occur, the
main bank provides directorships, management expertise, and even financial
assistance if necessary [Hoshi, Kashyap, and Scharfstein (1990); Kaplan and
Minton (1994)]. Taken together, these systems for mutual monitoring and
enforcement can be shown to align management incentives with group goals,
even without explicit managerial changes [Sheard (1989b), Berglöf and Perotti
(1994)]. To the extent that these group mechanisms facilitate monitoring of
managerial performance, efficiency of the group increases.

Studies of lending relations within the keiretsu produce complementary
evidence on the role of the main bank. For example, the fact that Japanese
bankers take greater equity positions where loan monitoring problems are likely
to be more severe is consistent with these equity relations playing a role in
reducing the cost of lending [Prowse (1990)]. Likewise, the greater stability
of investment behavior by keiretsu firms suggests the links between group banks
and members reduce the transaction costs of monitoring and enforcing loan
agreements [Hoshi, Kashyap, and Scharfstein (1990)]. To the extent that these
arrangements reduce transaction costs of lending within the group, they enhance
the chance horizontal keiretsu will prosper. Thus, at least for the horizontal
keiretsu, the literature has produced a coherent picture of how the observed
structural characteristics of horizontal keiretsu can be viewed as building blocks
of a system of internal monitoring.

This system of internal group monitoring stands in vivid contrast to what
has been referred to as the Anglo-American system of corporate governance,
where separate agents carry out the functions of ownership, management, an
lending, interacting via market transactions and relying on market-based solution
to monitoring problems [Garvey and Swan (1994)]. Markets for corporate contro
[Jensen and Meckling (1976)] and for managerial services [Fama (1980)] constrain
managers' behavior. Market pricing of debt and adroit choice of restrictive
coventants address borrower/lender agency problems [Smith and Warner (1979)].
The study of these markets has produced a well-developed body of literature
describing how market based monitoring mechanisms work.

Theory on the Japanese system of corporate governance suggests a tradeoff
to these monitoring strategies. Market based mechanisms require efficient-
functioning markets and large amounts of the firm's securities available to
purchase at market prices. Because the internal group monitoring system place
extensive stock ownership in friendly hands, it impedes the market for corporate
control, thereby weakening the external market monitoring mechanism.
Accordingly, a firm chooses between internal and external monitoring
mechanisms through its division of equity between group members and the
open market. Members of horizontal keiretsu have chosen to increase the efficiency
of internal monitoring at the expense of market monitoring.

However, despite the stylized picture of this Japanese corporate governance
system, there are many Japanese enterprises largely independent of any keiretsu
affiliation. The contrasting behavior of keiretsu and independent firms in areas
such as investment [Hoshi, Kashyap, and Scharfstein (1990)] and ownership
structure [Prowse (1992)] has led to the suggestion that there are two distinct
corporate governance systems in Japan, one among keiretsu-affiliated firms and
one among these independent firms. In particular, ties with a main bank, cross-
shareholding, and director exchanges within the keiretsu contrasts with the arms-
length relationships between lenders and trading partners characteristic of
independent firms, and suggests independent firms' monitoring systems are more
market oriented. Given the literature explaining the monitoring function of each
alternative system, a comparison is of interest. One major goal of this
paper is to examine the consequences of this choice of monitoring system for
efficiency by comparing the market performance of keiretsu and independent
firms in Japan.

In addition, Japanese vertical keiretsu groups have received far less theoretical
attention than their horizontal counterparts. However, the descriptive literature
makes clear that the monitoring structure for vertical groups differs both from
that of horizontal keiretsu and from that of independent firms. In particular,
the "pyramid" structure of these keiretsu implies a measure of unequal influence
where bigger firms are dominated by large firms [Miyashita and Russell (1994);
Lincoln, Gerlach and Takahashi (1992)]. Thus, vertical keiretsu member firms

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1Hoshi, Kashyap, and Scharfstein (1990) find that 8% of keiretsu firms have at least one director
from their main bank, while 34% have a former bank executive as a director. Gerlach and Lincoln
(1992) find that approximately two-thirds of all outside directors to large firms are from firms with a
banking or trading relationship.
face a different monitoring mechanism than independent firms, because they are subject to internal monitoring and control by the dominant firm. At the same time, the asymmetry of this relationship differs from the situation of horizontal keiretsu member firms, for whom monitoring is symmetric. It is possible that monitoring by the dominant firm improves managerial efficiency of the subservient firms, increasing their value. It is simultaneously possible that the dominant firm is able to extract value from the subservient firms (via pricing policies etc.) in ways not possible for symmetric group members. For these reasons, we wish to compare dominant vertical firms with ordinary vertical member firms, and both with independent and horizontal group firms.

Relatively few previous papers distinguish the behavior and characteristics of Japanese firms by group status. Caves and Uekusa (1976), as part of a general study of the industrial organization of Japan during the 1960s, compare profit rates of group and non-group firms. Nakatani (1984) compares several characteristics of group and non-group firms using data from the 1970s. Hoshi, Kashyap, and Scharfstein (1991) compare the investment behavior of keiretsu and non-keiretsu firms. This study extends these works in three respects. First, being motivated by the agency theoretic literature cited above, it extends the comparison to shareholder value as measured by Tobin’s q. Second, the paper considers more recent data. And third, its results reveal differences in firm’s characteristics depending on the nature of their relation to the keiretsu.

2. Data and Specification

Unless otherwise indicated variables are calculated as five-year averages of annual financial and ownership information and are obtained from the Nikkei Annual Industrial Unconsolidated data tape. The five-year averages preserve between-firm variation in structural characteristics, while smoothing out year-to-year fluctuations in other variables. A five-year interval was chosen to be long enough to average out random time series variation, but short enough to avoid major structural changes. The specific interval includes data for fiscal year ends 1985 through 1989. We end the sample interval in 1989 because the Japanese stock

market, after peaking near the end of that year, declined over 60 percent in the next two and one-half years. This dramatic market change may well have altered the relationships studied here. After discarding outliers our sample contains 566 firms with the necessary data.

2.1. Measuring performance

To measure the stock market’s evaluation of performance, we follow the growing number of authors who have used Tobin’s q to measure the impact of corporate governance structure on performance [e.g. Morck, Shleifer, and Vishny (1988); Hoshi and Kashyap (1990); McConnell and Servaes (1990); Lang and Stulz (1994)]. Since q is conceptually the ratio of a firm’s market value to the replacement cost of its assets, high q values are interpreted as evidence of superior management [Lindenberg and Ross (1981)]. In practice, replacement cost in particular can be difficult to observe. Consequently, q measures are generally based on ratios of market-to-book value with certain modifications. We essentially follow Hoshi and Kashyap (1990) in applying this approach to Japanese firms.

For Japanese businesses, a substantial portion of market value derives from holdings of nonoperational assets, real estate and equity [Frankel (1991); French and Poterba (1991)]. Since such assets are generally carried on the books at their purchase price, while investors presumably value them at market, asset price appreciation can greatly affect market-to-book value ratios. Since this effect has more to do with market price movements than managerial efficiency we remove the market value and book value of nonoperating assets. The resulting variables can be viewed as an estimated q for operations.

The numerator, which is conceptually the market value of operations, is calculated as the market value of equity and liabilities less the estimated market value of investments in real estate and financial assets. We follow Hoshi and Kashyap (1990) in estimating the market value of debt as the capitalized value of reported interest payments. The interest rate used in this calculation is an average of a short-rate (three-month corporate rate) and a long-rate (10-year corporate rate) for the years 1985 through 1989 [as reported in World Tables

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4 A much larger literature considers the characteristic of “the” Japanese firm, generally using data sets dominated by larger horizontal keiretsu members.

5 To determine whether our results are sensitive to the time period chosen, we compare our results to studies using earlier data. Morck, Nakamura, and Shleifer (1999) investigate the relationship between firms’ ownership structures, focusing on main bank relationships and q ratios, and find results consistent with ours for their years of study, 1976 and 1986. Weinstein and Yafeh (1998) also focus on the effects of bank-firm relationships on firm performance, and likewise find results consistent with ours over the period 1977 through 1986.

6 As alternative measures of performance we investigate the log of the five-year geometric average of common stock returns and also the five-year average of return on assets (ROA). Common stock returns measured over time provides an indication of how market participants value company prospects and in that sense measures perceived performance. ROA provides a measure of accounting profitability. Since this measure depends on accounting statements (the income statement for net income and the balance sheet for total assets) it provides an accurate assessment of relative firm performance only if accounting rules are applied uniformly across companies.
(1985)] weighted by the proportion of the book values of long-term and short-
term debt.

Consistent with Hoshi and Kashyap (1990) we use a recursive procedure to
estimate the market value of land holdings from reported book value data
beginning with fiscal year 1979. For this estimate we use the industrial property
index compiled by the Statistics Bureau, Management and Coordination Agency
[as reported in Japan Statistical Yearbook (1995)] as an index of land prices.
Lacking market values for land at the start of the recursion in 1979, we assume
the initial market value to be equal to book value in our reported estimates.
We also recalculated the regressions treating the initial market value as two
and three times book value. These alternative calculations do not materially
alter the results. We estimate the market value of financial assets following
the same procedure. Here the price index is the manufacturer’s price index
[as reported in World Economic Data (1991)].

The denominator of the $q$ ratio is conceptually the replacement value of
operating assets. Again, consistent with Hoshi and Kashyap (1990), we use
book value as an estimate of replacement cost for most assets. Book value of
real estate and financial holdings are excluded, consistent with our treatment
of market value. For firms that value inventories using the LIFO accounting
method we use Hoshi and Kashyap’s (1990) recursive method to estimate a
market value for inventory. This estimate is then used in place of book value.
Likewise, the market value of depreciable assets is estimated as in Hoshi and
Kashyap (1990) for use in place of book value. The denominator of the $q$ ratio
is therefore calculated as the book value of assets, less real estate and financial
assets, with estimated corrections for depreciable assets and LIFO inventories.

Table 1 describes the variables used in this study and Tables 2 and 3 provide
summary statistics. Theoretically, under the assumption of a competitive
environment and that future investment opportunities will just cover a firm’s
cost of capital, Tobin’s $q$ is expected to average 1.0. For our sample of 566
Japanese firms we find a somewhat higher average Tobin’s $q$ of 1.46.8 This
finding compares to $q$ calculations reported in other studies of Japanese firms
[i.e. Hoshi and Kashyap (1990)].

\begin{table}
\centering
\caption{Variables and the corresponding descriptions for firm performance, affiliation, ownership structure, leverage, risk, and control variables. All variables are five-year average.}
\begin{tabular}{|l|l|}
\hline
Variable Name & Variable Description \\
\hline
$q$ & The log of Tobin’s $q$, representing the ratio of market value to replacement costs. \\
KEIR & Dummy variable designating whether the firm is affiliated to a keiretsu group. \\
HORZ & Dummy variable designating whether the firm is affiliated to a horizontal keiretsu group. \\
VERT & Dummy variable designating whether the firm is affiliated to a vertical keiretsu group. \\
LEAD & Dummy variable designating whether the firm is the lead firm of a vertical keiretsu group. \\
FINC & The log of shares owned by financial institutions as a percentage of total shares outstanding. \\
CORP & The log of shares owned by other corporations as a percentage of total shares outstanding. \\
DEBT & The ratio of the book value of total debt to the book value of total assets. \\
BANK & The ratio of the book value of debt from financial institutions to the book value of total debt. \\
TRADE & The ratio of the book value of debt from other corporations to the book value of total debt. \\
RISK & The standard deviation in operating income. \\
INVEST & The average percentage change in new and replacement tangible fixed assets. \\
CAP & The average change in tangible fixed assets less depreciation as a percentage of net sales. \\
DEPR & Average yearly depreciation as a percentage of net sales. \\
R&D & Average research and development costs as a percentage of net sales. \\
\hline
\end{tabular}
\end{table}

$^7$Although treating initial book value as market value seems a natural assumption, it is likely to
underestimate market value to the extent that price appreciation occurred prior to 1979. Treating
initial market value as two and three times book value assumes 100% and 200% price appreciation
respectively. Based on Statistics Bureau data for prices of industrial land, 100% appreciation assumes
an average holding period of assets on the books of just under 9 years, while 200% assumes a
holding period of approximately 15 years.

$^8$We find stock price returns average 26.3% and ROA 2.3% for the five years 1985-1989. The
high stock returns over this period correspond with our findings of a relatively high Tobin’s $q$. 
Table 2. Descriptive statistics for sample of 566 Japanese firms. All variables are five-year averages with data obtained from the Nikkei Annual Industrial data tapes.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>q</td>
<td>1.46</td>
<td>0.88</td>
<td>0.01</td>
<td>3.97</td>
</tr>
<tr>
<td>FINC</td>
<td>37.0%</td>
<td>13.7%</td>
<td>0.7%</td>
<td>72.0%</td>
</tr>
<tr>
<td>CORP</td>
<td>27.3%</td>
<td>16.5%</td>
<td>0.8%</td>
<td>74.2%</td>
</tr>
<tr>
<td>DEBT</td>
<td>67.2%</td>
<td>17.3%</td>
<td>18.2%</td>
<td>97.8%</td>
</tr>
<tr>
<td>BANK</td>
<td>43.2%</td>
<td>18.9%</td>
<td>0.9%</td>
<td>91.1%</td>
</tr>
<tr>
<td>TRADE</td>
<td>32.5%</td>
<td>15.4%</td>
<td>0.3%</td>
<td>88.8%</td>
</tr>
<tr>
<td>RISK</td>
<td>1.8%</td>
<td>1.5%</td>
<td>0.1%</td>
<td>14.8%</td>
</tr>
<tr>
<td>INVEST</td>
<td>20.8%</td>
<td>16.2%</td>
<td>-13.2%</td>
<td>275.4%</td>
</tr>
<tr>
<td>CAP</td>
<td>-1.1%</td>
<td>2.1%</td>
<td>-13.4%</td>
<td>8.6%</td>
</tr>
<tr>
<td>DEFR</td>
<td>2.0%</td>
<td>2.1%</td>
<td>0.0%</td>
<td>11.3%</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>0.9%</td>
<td>2.0%</td>
<td>0.0%</td>
<td>13.4%</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keiretsu (KEIR)</td>
<td>338</td>
<td>59.7%</td>
</tr>
<tr>
<td>Horizontal (HORZ)</td>
<td>271</td>
<td>47.9%</td>
</tr>
<tr>
<td>Vertical (VERT)</td>
<td>57</td>
<td>10.1%</td>
</tr>
<tr>
<td>Lead (LEAD)</td>
<td>10</td>
<td>1.8%</td>
</tr>
<tr>
<td>Independent*</td>
<td>228</td>
<td>40.3%</td>
</tr>
</tbody>
</table>

*Firms that are not considered affiliated to a keiretsu group.

2.2. Independent variables

We use Industrial Groupings in Japan [Dodwell Marketing Consultants (1990)] as our source to determine firm affiliation. In our preliminary specification the resulting variable designates whether a firm is a member of a keiretsu (KEIR = 1) or is an independent firm (KEIR = 0). Furthermore, Dodwell (1990) classifies keiretsu affiliated firms as either members of a horizontal keiretsu, members of a vertical keiretsu, or as independent firms. The criteria used by Dodwell (1990) to classify firms as horizontal group members are: (1) the ratio of a keiretsu group’s shareholding to the total shares held by the top ten shareholders, (2) the characteristics and historical background of the keiretsu group, (3) the sources and amounts of bank loans, (4) whether keiretsu groups send or are the source of a company’s directors, (5) the company’s attitude toward the group, and (6) the company’s connections with non-group companies. We note that these criteria accord well with the theoretical elements of keiretsu monitoring and control described above. Cross-shareholding, borrowing patterns, and directorships are explicitly considered in theory. While difficult to quantify the other aspects arguably influence facility and responsiveness to monitoring.

Vertical keiretsu are large corporate groups that may be independent of, loosely connected to, or part of a horizontal keiretsu. These vertical keiretsu firms are concentrated within the business area of the dominant, lead firm. Dodwell (1990) considers the following criteria when classifying firms as vertical keiretsu member and as dominant firms within the vertical group: (1) a parent firm in the same industry holds a majority of the subsidiary shares, (2) the characteristics and historical background of the keiretsu group, (3) the sources and amounts of bank loans, (4) the parent appoints the CEO or other directors, (5) the company’s attitude toward the group, and (6) the company’s connections with non-group companies.

Lending relationships between firms, whether these firms are affiliated or independent, are often arranged in a manner to promote monitoring. In particular the regulatory environment in Japan allows financial institutions to have considerable equity and lending positions in the same firm, with lenders commonly taking advantage of this possibility.9,10 These relationships allow financial institutions to effectively gather otherwise costly information on borrowers, use this information to negotiate loan terms, send signals to other banks regarding the company’s soundness, and cement ties with firms receiving loanable funds [Hoshi, Kashyap, and Scharfstein (1990)]. In addition, a lender’s ownership position permits monitoring of borrower behavior and partial internalization of its consequences [Prowse (1990)]. Financial institutions can thereby reduce lending risk through monitoring advantages, while borrowing firms receive implicit protection against liquidity problems and even default [Hoshi, Kashyap, and Scharfstein (1991)]. Therefore, where these banking ties facilitate monitoring and information transfer, the cost of borrowing is effectively lowered [Nakatani

9 Banks are forbidden by law from holding more than 5% of the common stock in any one commercial firm, however financial institutions may have equity positions in many firms, that in turn, are interconnected through stock ownership. The legal limit on bank shareholding of any one company was 10% until 1987. This 10% ceiling is still in effect for insurance companies.

10 For example, Prowse (1990) demonstrates that for 57 of 133 keiretsu-affiliated firms, the largest stockholder is also the largest debtholder, and Sheard (1989b) finds that for 72 percent of firms the largest lender is one of the firm’s top five shareholders.
The nature of this relationship and its consequences are similar to those associated with group membership. However, these can occur whether or not the lending relationship is part of a wider ranging group affiliation or is confined only to the lending relation between bank and borrower. To avoid confounding lending relations with effects of group membership, we include the average percentage ownership by financial institutions (FINC) as a separate variable in our investigation.

An ownership interest by a non-financial corporation can be an extension of some long-term trade or other relation between companies. This occurs commonly, but not exclusively, within the context of a keiretsu relation. For completeness we include ownership by non-financial corporations (CORP) as an additional measure of ownership structure. Ownership by financial institutions and non-financial corporations represent the primary ownership constituencies in Japan. Mean percentage ownership by financial institutions (37.0 percent of outstanding shares) and corporations (27.3 percent) demonstrate the importance of affiliated firm ownership (64.3 percent). Keister (1986) and Prowse (1992) show similar percentage ownership statistics and highlight the differences between Japanese and U.S. stock ownership. The primary ownership difference is the substantially lower individual ownership and higher financial institutional ownership found in Japan. The concentration of affiliated firm ownership is demonstrated by Gerlach (1992b) who shows for the 10 largest shareholders of the Big Six Keiretsu the within-keiretsu shareholding in 1986 amounted to 51.4 percent for Sakura, 63.4 percent for Mitsubishi, 63.9 percent for Sumitomo, 38.1 percent for Fuji, 28.0 percent for Sanwa, and 31.6 percent for Dai-Ichi Kangyo.

In addition to these governance related variables, other variables are included as controls. We use the book value of total debt divided by the book value of total assets as a measure of total debt (DEBT). Our findings of an average debt ratio of 67.2 percent is consistent with previous studies [Keister (1986) and Allen and Mizuno (1989)]. This demonstrates that Japanese firms are able to carry high levels of financial risk, presumably since business risk may be reduced through cross-ownership and corporate affiliate relationships, and because the dual ownership and lending role of financial institutions protects debt value by limiting the use of suboptimal risky investment policies [Prowse (1990)]. The prominence of short-term financing and the accompanying limit on risk exposure may be another reason behind these relatively high debt ratios.

The standard deviation of operating earnings is used as a measure of risk (RISK). The average RISK of 1.8 percent implies relatively low business risk in Japan. This result is expected due to the presence of close business relationships and the incentives to support affiliated firms when necessary. Finally, we include indicator variables based on industry classification reported on the Nikkei datatapes, although the coefficient estimates are not reported in the interest of conserving space. To the extent that omitted factors vary by industry, they will be captured by these variables. Finally, to avoid undue influence by anomalous observations, a firm was excluded from the sample if its values appeared unreasonable. This procedure eliminates 22 observations leaving a sample of 566 firms.

3. Results

Table 4, model 1 reports the results of a regression based on the above discussion. We observe that the coefficient for the keiretsu membership variable (KEIR) is negative and statistically significant. In this sample, keiretsu membership diminishes performance as measured by $q$. When using ROA as the dependent variable the only difference is that the coefficient for keiretsu affiliation is insignificant, although it is of the same sign. When using stock returns, the coefficients for CORP and DEBT are positive and significant. Sample size varies

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Intercept</th>
<th>KEIR</th>
<th>FINC</th>
<th>CORP</th>
<th>DEBT</th>
<th>RISK</th>
<th>n</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>0.29</td>
<td>-0.00</td>
<td>-0.03</td>
<td>-0.01</td>
<td>-0.73</td>
<td>0.94</td>
<td>694</td>
<td>46.49%</td>
</tr>
<tr>
<td>(2.51)</td>
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<td>(3.33 )</td>
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</table>

12We also use the standard deviation in stock returns, but since results are similar we report only those for the standard deviation in operating earnings.

13Specifically, an observation was excluded if its stated debt ratio exceeded unity (DEBT > 1.0) or the calculated $q$ was negative ($q < 0.0$). Likewise, calculated $q$ values more than three standard deviations above the mean were excluded. Experimentation with alternative definitions of outliers did not materially affect the results.

14As alternative measures of firm performance we use the return on assets (ROA) and stock returns. We measure ROA as the five-year average of net income divided by total assets. Stock returns are measured as the log of the five-year geometric average stock return. Results using these alternative measures of performance are consistent with those using $q$ as our dependent variable.
Table 4. Parameter estimates of ordinary least squares regression models relating firm performance [ln(\(q\))] to affiliation [KEIR, HORIZ, VERT, and LEAD], ownership structure [FINC and CORP], leverage [DEBT, BANK, and TRADE], and firm risk [RISK]. The sample includes Japanese firms with necessary data on the NEEDS data tape. Coefficient values for industry indicator variables are not reported. (t-statistics are in parentheses)

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<td>(1.89)</td>
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<td>(3.75)</td>
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<tr>
<td>R²</td>
<td>29.26%</td>
<td>28.31%</td>
<td>30.22%</td>
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<td>F-STAT</td>
<td>9.06</td>
<td>8.44</td>
<td>8.89</td>
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</table>

*Significant at the 1% level.

because of added restrictions involved in calculating Tobin's \(q\). We analyze this result in more detail in later regressions.\(^{15}\)

In addition, the coefficient for ownership by financial institutions (FINC) is negative and significant. Firms that surrender equity to financial institutions are penalized. Prowse (1990) suggests that the opportunity to offer a lender an improved monitoring position, implied by an equity stake, should lower the cost of borrowing and raise the value of the firm. However, this capacity is not what is measured by the financial ownership variable. In the Japanese institutional setting this monitoring opportunity is available to all firms. Recalling that the regression controls for the relative amount of borrowing by the firm (DEBT), the financial ownership variable selects those firms required to surrender more equity to achieve the same level of borrowing. In this context, one interpretation of the negative coefficient is that this equity position adversely affects stockholders in the event of equity-lender conflicts. An alternative although not mutually exclusive explanation, is that those features of the firm which motivate lenders to require a larger equity position simultaneously reduce shareholder value.

In contrast, equity holdings by non-financial firms (CORP) do not have a statistically significant effect. In this sense, holdings by financial and non-financial firms differ. The control variables (DEBT and RISK) are both statistically significant, with DEBT having a negative effect while operating RISK has a positive influence.

### 3.1. Type of debt

Given that external ownership by financial and non-financial firms affect performance differently, we also check whether the impact of debt depends on its source. In model 2 of Table 4 we replace the variable measuring the relative amount of total debt with separate measures of bank and trade debt. Specifically, these variables are calculated as the percentage of debt from financial institutions (BANK) and the percentage from other corporations, which we use as a proxy for trade debt (TRADE). On average, bank borrowing accounts for 43.3 percent of all debt, while borrowing from other corporations amount to...
to 32.8 percent of the total. The coefficient for bank debt is little affected by the change. It remains negative and significant with a value very close to that of the combined debt variable. The coefficient for trade debt becomes less negative and its significance level becomes marginal ($p$-value = 5.9 percent). Again, relations with financial institutions seem to have a greater effect on performance. The coefficients of the other variables are not materially affected by this change.

3.2. The nature of group relations

Next, we examine how the type of keiretsu membership affects performance. Specifically, in model 3 of Table 4 we replace the variable indicating keiretsu membership (KEIR) with separate variables indicating firms that are members of a horizontal keiretsu (HORIZ), ordinary members of a vertical keiretsu (VERT), or are lead, dominant firms of a vertical keiretsu (LEAD). In cases where a lead vertical keiretsu firm is also a member of a horizontal group, it is counted only as a dominant vertical firm.

Among the members of vertical keiretsu, the results are consistent with the unequal influence postulated by Lincoln, Gerlach and Takahashi (1992). The coefficient for subservient vertical firms (VERT) is negative and statistically significant, while the coefficient for dominant vertical firms (LEAD) is positive, although not significant. Shareholders find less value in subservient vertical firms than in independent firms or dominant vertical firms. At the same time, the coefficient for horizontal member firms is negative and significant, suggesting a stock market preference for independent firms relative to horizontal keiretsu firms. The other variables in the regression are not significantly affected.

These results do not support the hypothesis that the monitoring mechanisms of the keiretsu system do a better job of maximizing shareholder value than do the systems of independent firms. Instead, they are consistent with the conclusion of Nakatani (1984) and of Caves and Uekusa (1976) that keiretsu firms behave as if they are pursuing goals other than wealth maximization. In addition, these results highlight the differences in performance among keiretsu member firms, particularly the advantaged position enjoyed by shareholders of the lead firms of vertical groups. Obviously, attention to this distinction is needed when comparing performance of keiretsu and non-keiretsu firms.

4. Alternative Explanations

In this section we examine other factors that may affect Tobin’s $q$ to assure that the previous conclusions regarding group affiliation and performance are robust.

4.1. Other variables

Previous studies using $q$ to measure corporate performance have shown that variables such as research and development expenditures, capital expenditures, and depreciation influence $q$. In model 4 of Table 5 these variables are added to the previous specification. Specifically, research and development expenditures (R&D) are calculated as the ratio of research and development cost (including amortized research and development cost) to net sales. Capital expenditures (CAP) is the ratio of the change in tangible fixed assets less depreciation to net sales. Similarly, depreciation (DEPR) is the ratio of depreciation recorded during the year to net sales. The coefficients of these additional variables are not significant individually, nor is a test of their joint effect significant at conventional levels. Adding these variables does not materially affect the other coefficient estimates.

4.2. Investment behavior

It is often suggested that group membership can improve access to capital, and consequently, can influence investment behavior. Hoshi, Kashyap, and Scharfstein (1991) demonstrate that non-keiretsu firms allow their investment behavior to

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*Most companies are limited to obtaining non-trade debt financing through bank loans due to regulatory and legal restrictions on the corporate bond market and the prevalence of collateral requirements. The commercial code in Japan prohibits corporations from issuing bonds in excess of stated value and reserve funds. In addition, until 1979 all corporate bonds were issued on a secured basis [Holder and Tschoegl (1985)].

*Dodwell (1990) identifies 31 vertical keiretsu groups of which 25 are associated with one of the Big Six horizontal keiretsu groups.

*Included in the evidence supporting this contention are comparisons of accounting profits for keiretsu and non-keiretsu firms. Using data from the 1970s Nakatani (1984) finds profits are negatively related to keiretsu affiliation. Using data from the 1960s Caves and Uekusa (1976) find the relation to be negative although not usually statistically significant.

*The test statistic for the joint hypothesis that all three coefficients are zero is 1.14, distributed $F(3,533)$ which is well short of the critical value of 2.6.
Table 5. Parameter estimates of ordinary least squares regression models relating firm performance \(\ln(p^{def})\) to affiliation [KEIR, HORZ, VERT, and DOM], ownership structure [FINC and CORP], leverage [DEBT, BANK, and TRADE], and control variables [RISK, INVEST, R&D, CAP, and DEPR]. The sample includes Japanese firms with necessary data on the NEEDS data tape. Coefficient values for industry indicator variables are not reported. (t-statistics are in parentheses)

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<td>8.74</td>
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*Significant at the 1% level.

be influenced by access to internal funds in a way that keiretsu firms do not, and conclude that keiretsu membership allows firms to avoid capital constraints. Underinvestment, due to capital constraints or other reasons, is argued to result in an increase in a firm's q ratio. The justification for this argument is that a constrained firm will choose only the best of available projects, while the unconstrained firm takes every project for which return exceeds the cost of capital. Consequently, the average ratio of expected return (which determines market value) to investment cost (which determines book value) would actually be higher for underinvesting firms. If this is the case, keiretsu members will exhibit lower q values simply because they are less capital constrained.

Although our sample period occurs during the rise of the "bubble" economy, which was a time of relatively greater availability of capital in Japan and an unlikely moment for capital constraints to be binding, we nevertheless test for the effects of capital investment by including a measure of investment. Investment (INVEST) is measured as the percentage change in tangible fixed assets adjusted for the fraction of yearly depreciation that can be allocated to tangible fixed assets. These results are based on our previous regression specifications and are reported as models 5 and 6 of Table 5. If group membership serves mainly as a proxy for investment, including an investment variable should seriously weaken the group effect. We find that the investment variable is not significant, nor does its presence affect the significance pattern of the ownership variables. The data do not support underinvestment as an explanation for our general result.

5. Conclusion

The empirical results for our sample suggest that horizontal keiretsu firms and ordinary members of vertical keiretsu are less effective at shareholder wealth maximization than independent firms and dominant vertical keiretsu firms. The result for vertical firms is consistent with the story of unequal influence found in Lincoln, Gerlach and Takahashi (1992) and Miyashita and Russell (1994). It underlines the importance of respecting the differences among keiretsu member firms when doing empirical work.

The results for the horizontal firms suggest that during the time period studied investors in the Japanese stock market viewed firms that are members of horizontal keiretsu less favorably than independent firms. In interpreting this result, we note that it need not conflict with explanations that keiretsu governance structures help increase the efficiency of group operations. It remains plausible that ownership ties and other relationships between main banks and their borrowers
reduce transaction costs of lending. Also, it may be the case that symmetric group monitoring enforced by a lead bank serves to align the incentives of individual firms and managers with those of the group, while insuring that the resulting group vision of target performance includes financial viability. Therefore, these firm groups characterized by extensive cross-shareholding plausibly function better with these organizational features than without. Nevertheless, these results do suggest that institutional arrangements of keiretsu groups, taken as a whole, do a less effective job of maximizing shareholder wealth than do the arrangements of the independent, market monitoring oriented firms. Granting that these group governance features help keiretsu function more effectively does not imply the net result they achieve is superior to that obtained through the alternative of market-based governance mechanisms. Nor do the empirical results presented in this paper support a belief in the superiority of the group-based monitoring system.

References


