Cross-Shareholdings and Equity Valuation in Japan

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Abstract

In this extensive analysis of the practice of cross-shareholding among Japanese companies and the impact on stock prices, three alternative measures of the extent of stable ownership of individual companies are used. The impact of cross-shareholdings on stock prices is analyzed using a combination of an EVA-type valuation model and earning forecasts by Nomura Securities analysts. This study suggests a significant positive relation between stock prices and one of the three measures of stable ownership, but not the other two, for reasons related to managerial incentives and the ownership structure of Japanese companies.

1. Introduction

In conjunction with the international harmonization of accounting standards, cross-shareholdings in Japan are now measured at fair value.[1] Financial accounting in Japan is in the midst of a transition from a focus on parent financial statements to consolidated figures, book value basis to market value basis, and cash basis to accrual basis. One result of these changes is that companies will no longer be able to use unrealized gains on stock holdings, which had been considered one of the advantages of cross-shareholdings, as "hidden reserves" for offsetting declines in operating profit. Moreover, without clear business reasons for doing so, it will likely become more difficult for companies to justify holding, for an extended period, stocks that do not generate returns in excess of their cost of capital. But at the same time, as long as corporate executives seek to be able to manage their companies in a stable manner, incentives for cross-holding shares will exist. The reality is that the practice of cross-shareholding exists in countries other than Japan as well, albeit to different extents. With the growth in global investing, we believe an examination of the impact of cross-shareholding on stock valuations is very worthwhile.

First, to establish the assumptions of our analysis, we specifically define the practice of cross-shareholding and estimate both the extent of cross-shareholdings and the unwinding of cross-shareholdings. We then look at the theoretical relationship between cross-shareholdings and stock prices. Specifically, we demonstrate that cross-shareholdings have a neutral impact on stock prices, assuming no impact on the company's fundamentals and assuming perfect capital markets. Next, we discuss a formula for adjusting P/E ratios for distortions stemming from cross-shareholdings, even with the assumption of a neutral impact on stock prices. We then empirically show whether cross-shareholdings do in fact affect stock prices.[2] This analysis relies on an EVA-type model for valuing companies based on earnings forecasts. We regress the difference between this theoretical value and the market price of a stock against the size of a firm and the cross-shareholding ratio, and test to see whether the ratio is statistically significant in explaining the price divergence. Finally, we look at the relationship between the practice of cross-shareholdings and corporate governance. Specifically, we consider the impact of cross-shareholdings on incentives for managers, companies' fundamentals, and the pricing of stocks.

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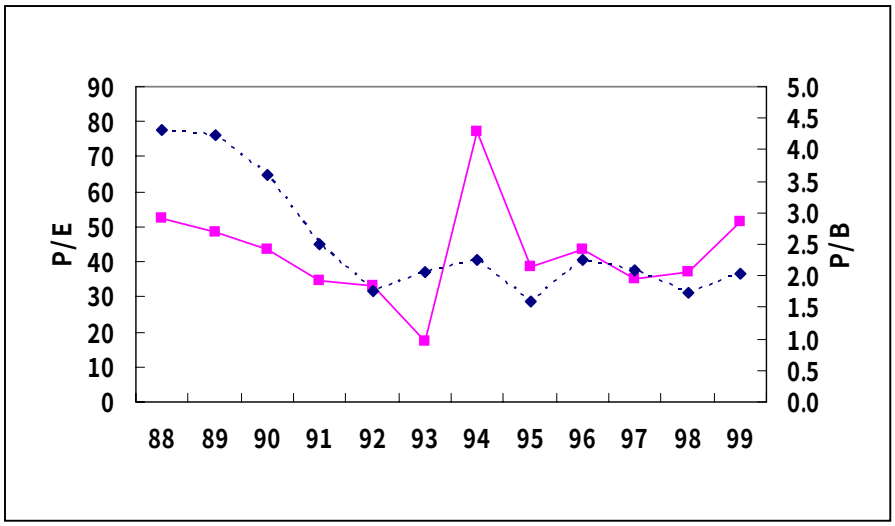
[1] The rule takes effect in fiscal 2001 (which ends in March 2002), although some companies adopted the rule early, in fiscal 2000.

[2] For studies of the relationship between the cross-shareholding ratio and P/E ratios for 1986-1992, see Ogishima (1993) and Ogishima (1994).

2. The pricing of stocks in Japan

During the bubble in asset prices in Japan in the latter half of the 1980s, stocks on average were considered to be overvalued relative to stocks in other countries based on P/E and P/B ratios. Figure 1 shows the trends in P/E and P/B ratios (consolidated basis) for stocks on the first section of the Tokyo Stock Exchange. Even by the latter half of the 1990s, P/Es in Japan were little unchanged from 10 years before, at about 50 times, mainly because of a downturn in corporate earnings (refer to the solid line in Figure 1). P/B ratios, however, fell by roughly half because of the decline in stock prices (refer to the dotted line in Figure 1). The high P/Es in the second half of the 1990s cannot be attributed to a decline in the risk premium, given that the credit risk of many Japanese companies increased and forced investors to be very selective. The high valuations reflected investors' illusions of future profit growth, which stemmed in part from the structure of cross-shareholdings in the market.[3] It is difficult to determine whether cross-shareholdings have an impact on stock prices, since a combination of two factors needs to be considered in trying to attribute high P/E ratios to cross-shareholdings: the distortions in P/E ratios as a result of mutual shareholdings, and the impact of cross-shareholdings on companies' fundamentals.

Figure 1. Trends in P/E and P/B ratios for Japanese companies, 1988-99



Notes: The data are based on stock prices, actual shareholders' equity, and EPS estimates for the current fiscal year, as of the end of June of each year, for stocks on the first section of the Tokyo Stock Exchange (excluding financials).

To properly compare P/Es in different countries, it is necessary to adjust for distortions caused by mutual shareholdings. This paper does not compare P/Es globally but rather

[3] Asano (1992).

presents an empirical analysis of the extent to which cross-shareholdings affect the pricing of stocks in Japan. Comparisons of P/Es across markets in different countries are problematic because of differences in the way profits are calculated based on different accounting standards. French and Poterba (1991) noted that if Japanese corporate earnings were calculated in line with U.S. accounting standards, the P/E of Japan's market in 1989 would have been 32.6 times rather than 53.7 times. Recently, analysts and investors have started to use both parent and consolidated financial statements to value Japanese stocks. Japanese corporate earnings need to be adjusted for a number of factors, including the adoption of market-value accounting starting in fiscal 2000, to be properly compared with corporate earnings in other countries.

3. Cross-shareholdings in Japan

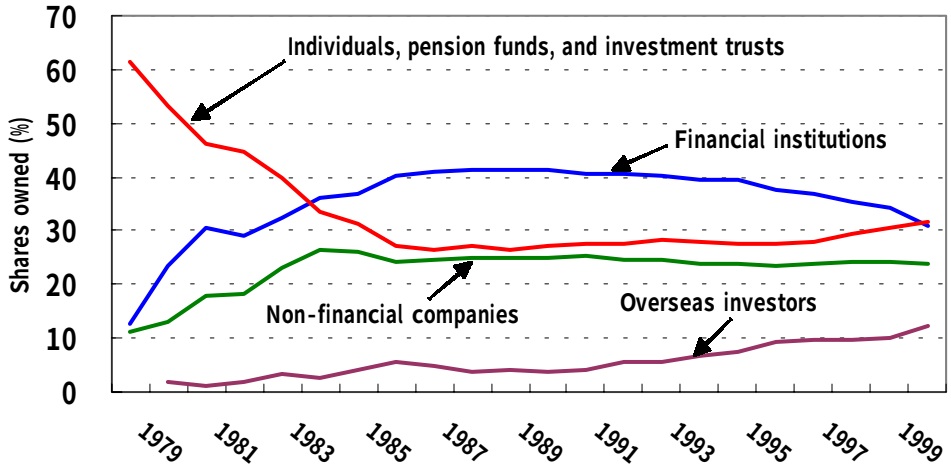
(1) The definition of cross-shareholdings

The *Nihon Keizai Shimbun* defines cross-shareholding as the practice of publicly traded financial institutions and non-financial companies strategically owning each other's shares. These companies have been increasingly unwinding, i.e. selling, their cross-held shares because the financial benefits of holding on to them have diminished as a result of the prolonged downturn in stock prices in Japan and the adoption of market-value accounting, which forces companies to periodically recognize gains on stock holdings. Cross-shareholdings also no longer serve as a way to smooth out earnings using unrealized gains and, given the emergence of default risk in the 1990s, are now unreliable as a safety net for companies that have run into financial trouble. In addition, anti-takeover provisions are said to destroy the value of companies, rather than allow management to focus on long-term issues, by weakening the control over companies provided by corporate governance.

Based on the *Nihon Keizai Shimbun's* definition, we use the term "cross-shareholdings" in this paper to refer only to shares that are mutually held among companies. In reality, cross-shareholdings take the form not only of mutual shareholdings between two companies, but also in many cases of an equity network among three or more companies. Also, life insurance companies often own shares of another company for strategic business reasons; these are referred to as strategic shareholdings, and fall under a broader definition of cross-shareholdings. Hence, although the textbook definition of the term "cross-shareholdings" refers to the relationship formed by mutual share ownership among publicly traded companies, such a strict definition does not hold because of the difficulty of objectively observing such a

relationship.[4]

Figure 2. Stock ownership in Japan and the United States, by type of investor



Source: "Shareownership Survey," published by the National Conference of Stock Exchanges; data as of the end of March of each year

One well-known source of shareholding data is the "Shareownership Survey" compiled by the National Conference of Stock Exchanges, which shows the proportion of stocks owned by different groups of investors. As shown in Figure 2, the share of stocks owned by individuals (including through corporate pensions and investment trusts) has declined from 69.1 percent at the end of March 1978 to 31.6 percent at the end of March 2000.[5] This recent proportion is very low compared with 71.7 percent for the United States (based on the Federal Reserve Bank's 1998 "Flow of Funds" report), and indicates that stock ownership in Japan is concentrated in the hands of companies. Over the same period, the proportion of stocks owned by financial institutions rose from 9.9 percent to 30.9 percent. Currently, non-financial companies own a high 23.7 percent of all stocks in Japan.[6] In comparison, banks and non-financial companies in the United States typically do not own many stocks, and hence the extent of cross-shareholdings is

[4] Fedenia, Hodder, and Triantis (1994) note that "cross-holding occurs when listed corporations own securities issued by other corporations." In addition, the scope of cross-shareholdings is not strictly defined given the range of cases, including life insurance companies' strategic holdings of other companies' shares, major equity stakes of individuals (in particular company founders), a parent company's holdings of shares in a subsidiary, group companies' holdings of shares in other group companies, mutual shareholdings between financial institutions and non-financial companies, and shareholdings for investment purposes that are coincidentally mutual.

[5] The figure hit a low of 27.5 percent in March 1996 and has risen slightly every year thereafter.

[6] The proportion owned by foreign investors rose from 10.0 percent to 12.4 percent in fiscal 1999. But in terms of the value of holdings, the percentage owned by foreign investors rose sharply from 14.1 percent to 18.6 percent in fiscal 1999, indicating that the large-cap growth stocks heavily owned by foreign investors performed fairly well in fiscal 1999.

limited.[7]

But such data alone do not provide any indication of the extent to which companies cross-hold shares or how such cross-shareholdings affect the pricing of stocks. One study, McDonald (1989), estimates that 24.2 percent of the outstanding shares of 75 companies traded on the first section of the Tokyo Stock Exchange are mutually owned. The coverage of the study, however, is too limited to provide definitive conclusions.

(2) Alternative measures of cross-shareholdings

Here we define "unilateral shareholdings" and "mutual shareholdings" as used in this paper. The amount of cross-shareholdings is assumed to be higher than the estimated amount of mutual shareholdings but lower than the estimated amount of unilateral shareholdings. A unilateral shareholding relationship is one in which Company A owns some of Company B's shares, regardless of whether Company B owns any shares of Company A. For instance, if Company A owns 1 million shares in Company B, but Company B does not own any shares in Company A, the total number of unilateral shareholdings is 1 million shares (1 million shares plus 0 shares). A mutual shareholding relationship is one in which Company A and Company B own each other's shares. For example, if Company A owns 1 million shares in Company B, but Company B does not own any shares in Company A, then the total number of mutual shareholdings is zero (0 shares plus 0 shares). A mutual shareholding relationship exists only if Company A owns, for instance, 1 million shares of Company B and Company B owns half a million shares of Company A. In this case, there are several different ways to calculate the total number of mutual shareholdings. In the same example, the total number of mutually held shares could be considered to be 1.5 million shares (1 million plus 0.5 million), or it could be considered to be 0.5 million shares (0.5 million shares are held mutually, while the purpose of the remaining 0.5 million shares held by Company A is unclear). In this paper, the half million shares of Company A's stock owned by Company B are considered to be a mutual shareholding; the 1 million shares of Company B owned by Company A are also considered to be a mutual shareholding; and the total number of mutual shareholdings for Company A and B is considered to be 1.5 million shares.

To analyze unilateral shareholdings and mutual shareholdings for each Japanese company, two sources were used: Toyo Keizai data on companies' major shareholders,

[7] Bohren and Michalsen (1994) estimate the cross-shareholding ratio in the United States at 3 percent, in Norway 16 percent, and in Japan 47 percent.

and company securities filings (*yuka shoken hokokusho*).

Company securities filings contain various information on the stock holdings of publicly trading Japanese companies, such as the specific stocks, the number of shares owned, and the purchase prices. However, these data are not complete. For example, the category "other holdings" does not include the names of these individual stock holdings. In addition, shares of affiliated companies are excluded since they are included in a separate section of the company securities filings. Furthermore, it is impossible to obtain data on shares owned by banks since they do not disclose their marketable securities holdings. Toyo Keizai data on companies' major shareholders is thus used to supplement the information available in company securities filings. The Toyo Keizai data include the top 20 shareholders of each Japanese company, including banks. For instance, if Bank A is one of the 20 largest shareholders of Bank B, with a holding of 10 million shares of Bank B, this information will appear in the Toyo Keizai data. Still, these data are not comprehensive since the coverage is limited to the 20 largest shareholders. The Toyo Keizai data include shares held by affiliated companies, as affiliates are very often among the top 20 shareholders. If the data in the company securities filings and the Toyo Keizai data are identical, the latter source is used to avoid duplication.

In this paper, we analyze three alternative measures of cross-shareholdings—the stable shareholding ratio, the unilateral shareholding ratio, and the mutual shareholding ratio.

1) The stable shareholding ratio

The stable shareholding ratio is calculated by dividing the aggregate number of shares held by the largest 20 shareholders and all listed companies (including OTC companies) by the total number of outstanding shares. This ratio encompasses a wide range of shareholding relationships, such as cross-shareholding ties between non-financial companies, those between non-financial companies and banks (primarily the main banks that they rely on most for loans and other banking services), as well as strategic investments by life insurance companies and investments by foreign companies and individuals. Since Japanese life insurance companies are not shareholder-owned corporations, they cannot be part of mutual shareholding relationships. However, since they tend to own shares of other companies for strategic reasons, they can be considered stable shareholders. Companies with high stable shareholding ratios generally have many affiliates that are large companies. Even companies with relatively low stable shareholding ratios have a number of banks and life insurance companies among their

top shareholders. Accordingly, nearly all Japanese companies have stable shareholding ratios of at least 20-30 percent.

2) Unilateral shareholding ratio

This ratio is calculated by dividing the number of unilateral shareholdings, as defined earlier, by the total number of outstanding shares. The universe of companies used to calculate this ratio consists of all Japanese companies traded on the exchanges and the OTC market. Mutual shareholdings constitute a subset of unilateral shareholdings. The unilateral shareholding ratio can be thought of as the stable shareholding ratio, excluding shares owned by major individual shareholders, privately held companies, and life insurance companies. Considering that many cross-shareholding relationships are triangular, the unilateral shareholding ratio is sometimes used as a definition for the cross-shareholding ratio.

3) Mutual shareholding ratio

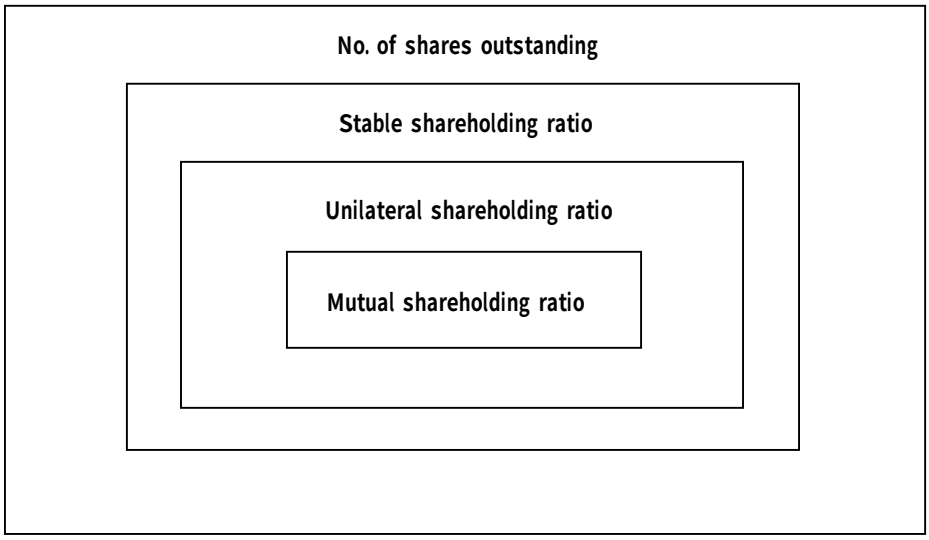
The mutual shareholding ratio is calculated by dividing the number of mutual shareholdings, as defined earlier, by the total number of outstanding shares. The universe of companies used to calculate this ratio consists of all Japanese companies traded on the exchanges and the OTC market. Many of the companies with a relatively low mutual shareholding ratio are subsidiaries of large corporations. One reason is that Article 211, Section 2, of the Commercial Code specifically stipulates that a subsidiary with more than 50 percent of its shares owned by its parent company cannot own shares of the parent company, just as it cannot hold on to its own shares as treasury stock.[8] The mutual shareholding ratio does not take into account triangular cross-shareholding relationships. Therefore, based on the definition of mutual shareholdings noted earlier, companies that do not own each other's shares are not included in the ratio, even if one of them owns a significant amount of the other company's shares. In addition, because of the limitations on the available data, mutual shareholding ratios for *keiretsu* group companies may be underestimated. If the top shareholders are banks and life insurance companies, then it is not possible to use Toyo Keizai data on companies' major shareholders to supplement data on keiretsu companies' shareholdings. Hence, mutual shareholding ratios underestimate the actual amount of cross-held shares, and could be substantially different from the actual figure in the case of some stocks.

We estimate cross-shareholdings for individual stocks using the three alternative measures above. By definition, the stable shareholding ratio is greater than or equal to

[8] These restrictions on treasury stock were relaxed in late 2001.

the unilateral shareholding ratio, which in turn is greater than or equal to the mutual shareholding ratio. (See Figure 3.) Nevertheless, each of the measures, most notably the mutual shareholding ratio, has its own characteristics.

Figure 3. Three measures of cross-shareholdings



Similar measures published by the *Nihon Keizai Shimbun* and Toyo Keizai include the free float,[9] the proportion of shares owned by stable shareholders,[10] and the proportion owned by foreign investors.[11] Companies' securities filings also include shareholder information, including the proportion of shares owned by financial institutions (banks, trust banks, investment trusts, and life insurance companies).

The stable shareholding ratio has a strong positive correlation with the proportion of shares owned by stable shareholders and the unilateral shareholding ratio, and a strong negative correlation with the free float. In addition, the mutual shareholding ratio has a relatively strong positive correlation with the proportion of shares owned by financial institutions, a negative correlation with the proportion of shares owned by stable shareholders, and a weak positive correlation with all other ratios. The remainder of this paper analyzes in various ways the three measures for cross-shareholdings defined earlier.

[9] This figure is the percentage of shares owned by those with fewer than 50 lots (one lot is typically 1,000 shares for a stock with a par value of 50 yen).
[10] These shares are not expected to be freely bought or sold, and are calculated as the number of shares owned by the 10 largest shareholders, executives and other insiders, excluding those shares considered to be clearly not locked up.
[11] Foreign investors include companies and individuals from outside Japan.

(3) The extent of cross-shareholdings and unwinding of cross-shareholdings

A number of research institutions have estimated the extent of cross-shareholdings in Japan's stock market. However, most of these studies have focused on stocks that trade on the first section of the Tokyo Stock Exchange, or use measures that have not been indexed to maintain comparability over time. Table 1 shows the trend in estimated aggregate cross-shareholding ratios (based on the three alternative measures) for all Japanese companies traded on the exchanges and the OTC market. Because these ratios have been adjusted each fiscal year to maintain consistency over time, the results shown in the table are a relatively accurate indication of the extent to which cross-shareholdings have been unwound.[12] Typically, cross-shareholding ratios are calculated by dividing the cumulative number of shares held by all companies by the total number of outstanding shares for each fiscal year. The figures in Table 1, however, are weighted by market capitalizations. The use of market-capitalization weightings has been considered inappropriate for calculating cross-shareholding ratios because of the relatively significant potential impact from stock price fluctuations. To avoid this problem and eliminate misleading observations of changes in cross-shareholding ratios stemming from changes in stock prices and capital structure, the ratios have been adjusted using an index that results in the same market capitalization between two points in time.

The use of a ratio weighted by market capitalization also eliminates possible problems relating to newly listed companies, which may have an inappropriate impact on the simple average of the cross-shareholding ratio if the newly listed company's ratio is higher or lower than the average. With this method of retroactive adjustments, the ratio can serve as a measure of the extent to which cross shareholdings have been unwound. Most cross-shareholding data indicate that cross-shareholdings in Japan have been unwound more quickly than the data in Table 1 indicate. One reason for the discrepancy is that the stock prices of companies with relatively high cross-shareholding ratios have declined more than the stock prices of companies with comparatively low cross-shareholding ratios have. In particular, the decline in the stock prices of Japanese banks, which have relatively high cross-shareholding ratios, has made it appear as

[12] The cross-shareholding index is calculated as follows. First, the cross-shareholding ratio, $h'(t_2)$, is calculated using recent market cap weightings. The cross-shareholding index $h(t_2)=h'(t_2)$. Next, the cross-shareholding ratio one period prior, $h''(t_1)$, is calculated using recent market cap weightings. The extent of the unwinding of cross-shareholdings $D_2=h'(t_2)/h''(t_1)$. The cross-shareholding index one period prior $h(t_1)=h(t_2)/D_2$. Likewise, the cross-shareholding index two periods prior $h(t_0)=h(t_1)/D_1$. However, $D_1=h'(t_1)/h\,''(t_0)$, with the quotation mark representing the use of market cap weightings one period later and the apostrophe representing the use of market cap weightings at the time. Hereafter, the cross-shareholding index for each fiscal year is retroactively calculated in the same manner.

though overall cross-shareholdings in Japan are being unwound more quickly than the data in Table 1 would suggest. Similarly, the listing of NTT DoCoMo, which has a relatively high cross-shareholding ratio, and the subsequent sharp rise in the company's stock price have inflated other cross-shareholding data.

Table 1. Trends in the unwinding of cross-shareholdings in Japan

	TOPIX companies			All listed stocks		
	Stable shareholder ratio	Unilateral shareholding ratio	Mutual shareholding ratio	Stable shareholder ratio	Unilateral shareholding ratio	Mutual shareholding ratio
1988	50.6	31.6	18.0	52.3	30.8	18.7
1989	50.1	31.8	18.4	51.8	31.0	18.9
1990	49.8	31.8	18.4	51.3	31.1	17.7
1991	50.1	31.9	18.8	51.6	31.2	18.2
1992	49.6	31.4	18.8	51.1	30.8	18.2
1993	49.6	31.4	18.9	51.0	30.8	18.0
1994	49.0	31.1	18.8	50.4	30.5	17.9
1995	48.9	31.3	18.8	50.2	30.7	18.0
1996	48.1	30.8	18.5	49.4	30.2	17.7
1997	47.8	30.8	18.4	49.0	30.3	17.6
1998	47.4	30.8	18.1	48.5	30.2	17.3
1999	44.1	28.2	16.3	45.4	27.8	15.7

Notes: Units are percentages, as of the end of each fiscal year in March. Figures are based on Toyo Keizai's major shareholder data and companies' securities filings, and are adjusted for changes in equity capital.
Source: Nomura

As shown in Table 1, cross-shareholdings in Japan were significantly unwound from March 1998 to March 1999. In addition, all three ratios—namely the stable shareholder ratio, the unilateral shareholding ratio, and the mutual shareholding ratio—indicate that cross-shareholdings were gradually unwound starting in the early 1990s. Also, because of the inclusion of many companies heavily owned by their founders, all Japanese companies traded on the exchanges and the OTC market as a group have a higher stable shareholding ratio but lower unilateral shareholding ratio and mutual shareholding ratio than just the TOPIX companies do.

4. The relationship between cross-shareholdings and stock prices

Some argue that cross-shareholdings tend to push stock prices up, and that the unwinding of cross-shareholdings tends to put downward pressure on stock prices.[13] Some argue that cross-shareholdings tend to push stock prices up, and that the unwinding of cross-shareholdings tends to put downward pressure on stock prices.

[13] For an overview, see, for instance, Kobayashi (1990) and Niimi and Yonezawa (1994).

Theoretically, the impact of cross-shareholdings on stock prices should be neutral, assuming perfect capital markets with ample liquidity, the simultaneous receipt of information by investors, and no transaction costs.

Let us illustrate with an example. Two companies, Company A and Company B, exist, and their current stock prices are denoted as P_A and P_B, respectively. The total number of outstanding shares, denoted as N, is the same for Company A and Company B. Company A buys α percent of Company B's total outstanding shares in the secondary market, while Company B purchases β percent of Company A's total outstanding shares in the market. Company A generates per-share cash flow of P_A x r each year, and similarly Company B generates per-share cash flow of P_B x r each year, where r is the expected market return. Company A has surplus funds of C_A yen per share outstanding, and Company B has excess funds of C_B yen per share outstanding.

To purchase Company B's shares in the secondary market at the current market price, Company A will need α x P_B x N yen worth of funds. Therefore, after Company A purchases Company B's shares, Company A's excess funds will be (C_A x N – α x P_B x N) yen. Similarly, Company B will need β x P_A x N yen worth of funds to buy Company A's shares, and Company B's excess funds will be (C_B x N – β x P_A x N) yen after it purchases Company A's shares.

The share prices of Company A and Company B after the mutual shareholding relationship is established are denoted as P_A' and P_B', respectively, and the following two equations can be derived to represent each company's market value.

$$(P_A - C_A)\,N + (C_A \times N - \alpha \times P_B \times N) + P_B' \times \alpha N = P_A' \times N$$
$$(P_B - C_B)\,N + (C_B \times N - \beta \times P_A \times N) + P_A' \times \beta N = P_B' \times N$$

These equations can be used to show that $P_A' = P_A$ and that $P_B' = P_B$, indicating that the stock prices of both Company A and Company B do not change after they purchase each other's stocks in the market. The market capitalizations do not change because neither company has raised additional equity financing through a private placement. In other words, the excess funds of Company A and Company B were simply used for stock investments, and the present values of both investments are equal to the initial investments, assuming perfect capital markets.

In Japan, cross-shareholding relationships are often established through private placements. Let us assume in the above case that companies A and B buy each other's shares by issuing new shares instead of using surplus funds. In this case, since the proceeds from the private placement are equal to the amount needed to buy the shares to

be newly issued by the mutual shareholding company (in other words, it is a perfect mutual shareholding relationship in which neither Company A nor Company B needs to raise financing), $\beta \times P_A' \times N = \alpha \times P_B' \times N$. Furthermore, the following two equations can be derived to represent each company's market value:

$$(P_A - C_A)N + C_A \times N + P_B' \times \alpha \times N = P_A' \times (1 + \beta)N$$
$$(P_B - C_B)N + C_B \times N + P_A' \times \beta \times N = P_B' \times (1 + \alpha)N$$

These equations can be used to prove that $P_A' = P_A$ and that $P_B' = P_B$, indicating that the stock prices of companies A and B do not change after they purchase each other's stocks through a private placement. Each company's market capitalization will increase in proportion to the increase in the number of shares outstanding because their stock prices do not change.

In the above way, it is evident that cross-shareholdings theoretically have a neutral impact on stock prices, much in the same way that share buybacks have a neutral impact on stock prices. Share buybacks, however, can affect stock prices through the so-called announcement effect, whereby investors have increased expectations of a rise in the value of the company because they regard the announcement of a share buyback program as a sign that executives are serious about using the company's assets more efficiently. Similarly, if cross-shareholding relationships are believed to influence the fundamental value of a company, these relationships can affect stock prices, depending on the type of cross-shareholding relationship in place. In other words, the impact of cross-shareholdings on stock prices is neutral only under the assumption that they have no impact on the fundamentals of a company.

Proving that cross-shareholdings actually have a neutral impact on stock prices is difficult for two reasons. First, it is possible that cross-shareholdings have some influence on the fundamentals of a company. Second, it is erroneous to compare two stocks and conclude that the stock with the higher price is overvalued. The conventional valuation measure for stocks is the P/E ratio, which is based on earnings per share (EPS) under the assumption of a steady state. It is extremely difficult to prove if the impact of cross-shareholdings on stock prices is neutral based on P/E ratios, since P/E ratios can be influenced by cross-shareholdings. This impact is discussed in the following section.

5. The relationship between cross-shareholdings and the P/E ratio

The P/E ratio for a company with cross-shareholding relationships is said to be

inflated[14] because whereas the stock is priced based on earnings from operations and capital gains from investments in other companies, earnings in the denominator reflect dividends received but not capital gains. Consequently, all other things being equal, the P/E ratio for a company that owns shares of another company tends to be higher than that for a company that holds only cash. However, this problem has more to do with the P/E ratio itself rather than with cross-shareholdings, and can be resolved by deducting from the numerator of the P/E ratio the current market value of a company's capital invested in non-physical assets (which is equal to the present value of the expected future cash flows from these investments), and deducting from the denominator the present value of the expected dividend income from the investments.

Cross-shareholding relationships in the form of mutual shareholdings can also result in inflated P/E ratios, which can be adjusted by deducting from the numerator the portion of market capitalization that is effectively double counted, and subtracting from the denominator dividends received from the counterpart in the mutual cross-shareholding relationship. Note that the P/E ratio for a company in a mutual cross-shareholding relationship will equal the P/E ratio for a company not in a cross-shareholding arrangement, if the dividend payout ratio for both companies in the mutual cross-shareholding relationship is 1. Mathematically, the relationship between two companies in a mutual cross-shareholding relationship can be expressed as:[15]

(1 – cross-shareholding ratio)/(1 – dividend payout ratio x cross-shareholding ratio)

To compare average market P/E ratios across countries, the P/E ratios used are adjusted by multiplying the unadjusted market P/E ratios by the above expression.

If P/E ratios are boosted by cross-shareholdings, the implication is that investors recognize a relationship between cross-shareholdings and P/E ratios. However, if investors do not take into account the aforementioned adjustments for the P/E ratios of companies in cross-shareholding relationships, then cross-shareholdings may not actually push up a company's P/E ratio. Because it is difficult to estimate the degree to which each P/E ratio needs to be adjusted for cross-shareholdings, most investors probably do not pay much attention to the possible upward bias cross-shareholdings may have on P/E ratios. Also, since investors do not base their investment decisions solely on P/E ratios, the possible impact of cross-shareholdings on P/E ratios is

[14] See Ueda (1989) for a detailed explanation. Also, Ikeda (1992) notes that if a cross-shareholding relationship involves more than two companies, whether P/E ratios are deflated or inflated is indeterminate.

[15] Yasuda and Hayashi (1988) use this expression.

probably not very significant.

Cross shareholdings introduce similar biases into other financial metrics. Because stock returns[16] are closely linked to market capitalization and dividends, cross-shareholdings can influence returns on stock investments. Financial leverage[17] can also be affected by cross-shareholdings because executives can increase shareholders' equity simply by increasing cross-shareholdings. However, price-to-book ratios (P/B ratios) are not as significantly influenced by cross-shareholdings as other metrics are. P/B ratios are not directly linked to dividends, and market capitalization increases in line with shareholders' equity. However, investors cannot solely rely on the P/B ratio to value stocks because book values only reflect the current liquidation value of a company and not expected future returns.

6. Cross-shareholdings and the pricing of stocks

(1) Stock valuations

In this paper, we have assumed perfect capital markets. In other words, transaction costs, taxes, and restrictions on transactions have been ignored; all investors receive information simultaneously; and the market has unlimited liquidity. In such a market, even if cross-shareholdings are unwound, stock prices do not change because arbitrage immediately takes place. Said differently, stock prices do not rise because of cross-shareholdings.

A determining factor of investors' expectations of future stock prices is the valuation metric used. When Japan's stock market rose during the economic bubble years of the latter half of the 1980s, investors shifted their focus from corporate profits to the value of a company's assets, and increasingly based their investment decisions on P/B ratios rather than P/E ratios. However, as mentioned, it is problematic to base investment decisions only on P/B ratios because they do not incorporate expectations of future profits. As the domestic stock market declined substantially in the 1990s, traditional valuation measures came into question.

The fair market value of a stock based on the dividend discount model (DDM), one of the most commonly used valuation models, is the present value of future dividends expected based on all currently available information.

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[16] Fedenia, Hodder, and Triantis (1994) point out that cross-shareholdings distort stock returns.

[17] Boren and Michalsen (1994) assert that debt ratios in Japan appear significantly lower than in the United States and Norway as a result of cross-shareholdings.

$$P_t = \sum_{i=1}^{\infty} \frac{E[D_{t+i}]}{(1+r_e)^i}$$

E(D): The expected dividend at time *t+i* based on the information available at time *t*
r_e: The cost of equity capital at time *t*

The DDM assumes that the cost of equity capital is constant, regardless of the time period. To use analysts' earnings estimates rather than dividends, it is instructive to use the Edwards-Bell-Ohlson (EBO) model.

(2) The EBO model[18]

The EBO model, shown in the equation below, is derived from the DDM, and can be rewritten as the reported book value plus an infinite sum of the discounted residual income. The EBO model makes it possible to intuitively understand the relationship between economic profits and the value of a company in each period. In addition, the EBO model and discounted cash flow (DCF) models assume that ROE reverts to the mean over the long run. Let us break down the value of a firm P into two parts. The first term on the right-hand side of the equation below represents the reported book value (B), and the second term represents the present value of future residual income. The term (ROE – r_e) in the numerator represents the profitability in excess of the cost of equity capital in each future period. When a company can generate returns only in line with its cost of equity capital, then the excess return is zero. In other words, the value of a company that is not likely to generate value-added in the future is only equal to its reported book value.

$$P_t = B_t + \sum_{i=1}^{\infty} \frac{E[(ROE_{t+i} - r_e)B_{t+i-1}]}{(1+r_e)^i}$$

Dividing both sides of the above equation by B_t, we get an expression for the familiar P/B ratio:[19]

$$P_t / B_t = 1 + \sum_{i=1}^{\infty} \frac{E[(ROE_{t+i} - r_e)B_{t+i-1}]}{(1+r_e)^i \cdot B_t}$$

[18] See, for example, Frankel and Lee (1998) and Ohlson(1995).

[19] The actual price-to-book ratio alone cannot be used to determine whether a stock is undervalued or overvalued. However, a comparison of the theoretical P/B ratio and the actual P/B ratio can be used as a basis for valuing stocks because the theoretical P/B ratio incorporates expectations of future value-added.

Based on the EBO model, there are two factors that may cause a company's P/B ratio to decline. First, an increase in a company's risk premium, because of a decline in market capitalization or a rise in credit risk, may put downward pressure on a company's P/B ratio. Second, a P/B ratio may decline as a result of lower expected returns. If the expected return on a stock is higher than investors' required rate of return, and not expected to revert to the required rate of return in the short term, a company's P/B ratio should be high. A relatively strong impact from a high risk premium would suggest that a company's P/B ratio is closely linked to factors that affect the risk premium, such as the size of a company, while a relatively strong influence from expected returns would suggest that a company's P/B ratio is largely a function of expected ROE.

To find out to what extent the theoretical P/B value derived using the EBO model can explain actual P/B ratios, we used a simple regression model. The sample size for the cross-sectional analysis for the end of April and the end of May is extremely small because at these points in time, following-year estimates for companies with fiscal years that end in March are not yet available. Hence, the analysis loses consistency. We thus excluded these two months each year from our period of analysis.

The next two paragraphs discuss the inputs for the EBO model. Because it is impossible to accurately forecast the future cash flows of a company, theoretical values for expected cash flows based on all currently available information are estimated. The projected ROE of a company, meanwhile, can be calculated based on earnings estimates for the current fiscal year and the following fiscal year.[20] There are a number of ways to set the residual value for next fiscal year and beyond. Here, we determine the theoretical value based on two methods. First, we assume no value-added is generated beyond the cost of capital in the following fiscal year and beyond. In other words, the ROE is the same as the required return for investors. We designate this theoretical value as PBR.EBO1. Also, ROE0 is the ROE for the current fiscal year, and ROE1 is the ROE for the following fiscal year. Based on the equation, a cost of capital r_e of 5 percent, an ROE for the current fiscal year of 25 percent, and an ROE for the following fiscal year of 20 percent result in a PBR.EBO1 of 1.36.

$$PBR.EBO1 = 1 + \frac{ROE0 - r_e}{1 + r_e} + \frac{ROE1 - r_e}{(1 + r_e)^2} \cdot (1 + ROE0)$$

[20] Earnings estimates are Nomura estimates for parent after-tax earnings. Where Nomura's estimates are not available, company estimates compiled by Toyo Keizai are used, and where company estimates are not available, analysts' estimates compiled by the *Nihon Keizai Shimbun* are used.

Next, we assume that the value-added for the following fiscal year continues to be generated indefinitely thereafter. We designate this theoretical value as PBR.EBO2. Based on the equation, a cost of capital r_e of 5 percent, an ROE for the current fiscal year of 25 percent, and an ROE for the following fiscal year of 20 percent result in a PBR.EBO2 of 5.44. Perhaps somewhat obvious, PBR.EBO2 is greater than PBR.EBO1 since the former includes the present value of the value-added from the following fiscal year and thereafter.

$$PBR.EBO2 = PBR.EBO1 + \frac{ROE1 - r_e}{(1+r_e)^2 \cdot r_e} \cdot (1+ROE0) \cdot (1+ROE1)$$

In this analysis, the cost of capital r_e is set at 5 percent[21] for all companies based on the assumption that the cost of capital does not significantly vary among companies. It is difficult to measure investors' required rate of return. Although risk premia are assumed to be equal for all companies in this analysis, company size is considered separately as a factor that may cause risk premia to differ.[22] Financial leverage can vary even among companies with identical ROEs, resulting in differing volatility risk for ROE. Different financial leverage ratios among companies are typically reflected in their different costs of capital. However, it should be noted that exceptionally high shareholders' equity ratios might affect the results of this analysis.

In the above way, we have established two models, PBR.EBO1 and PBR.EBO2. But in reality, these two models represent the most extreme cases; neither is likely to be suitable for valuing all companies. In other words, it is unlikely that value-added equal to the difference between the following fiscal year's ROE and the cost of capital is likely to continue indefinitely, and at the same time it is unlikely that the value-added two fiscal years out will be zero. A more realistic scenario is that the value-added generated by a company gradually declines, and the returns only match the cost of capital in several years or decades. Thus, PBR.EBO1 underestimates the value-added, whereas PBR.EBO2 overestimates the value-added. This type of bias in the model means that the value-added of a high ROE company is either underestimated or overestimated, compared with a low ROE company with the same cost of capital. This model bias should be corrected as much as possible. Figure 4 illustrates this point. For a

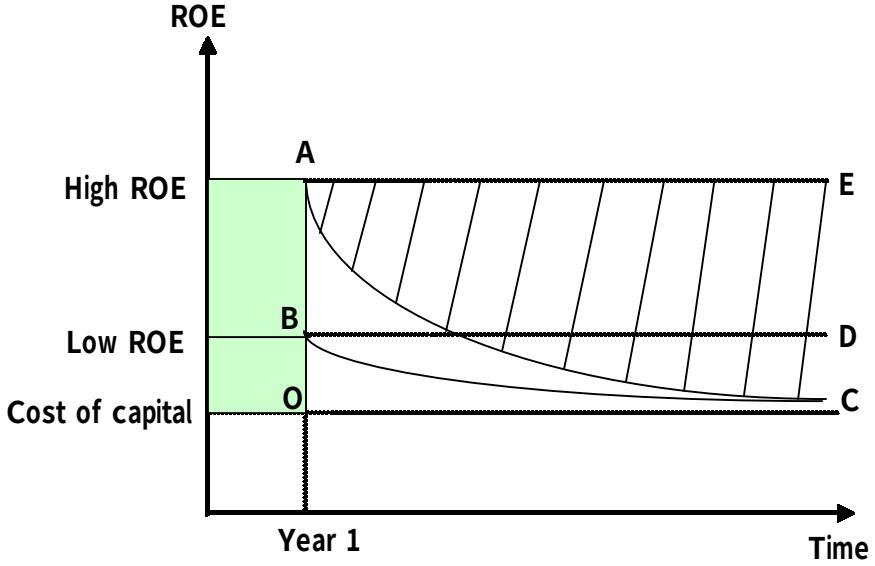
[21] This figure is equivalent to a P/E ratio of 20x (the reciprocal of 5 percent).

[22] It may seem inappropriate to assume the same risk premium for all companies, given the increasing differences in credit risk among companies recently. But some studies, such as Frankel and Lee (1998), confirm that the cost of capital has very little impact on the results of cross-sectional analyses.

high ROE company, the value-added represented by the area AOC should be discounted to the present value, but the PBR.EBO2 model discounts the area AOCE to the present value. The result is an overestimation of the value-added, more so than in the case of a low ROE company, whose value-added represented by the area BOCD is discounted to the present value. Since area ACE is bigger than area BCD, the higher the ROE of a company, the greater the overestimation of the value-added. Conversely, when the period of analysis is only one year, the area for a high ROE company is represented only by AOC and that for a low ROE company is represented only by BOC, meaning that the value-added of high ROE companies, which are represented by large areas in the figure, is overestimated.

To minimize the model bias as much as possible, we did an empirical analysis using the EBO model for the period with the smallest bias.

Figure 4. The relationship between the EBO model and ROE



(3) Terms of analysis and an optimal EBO model

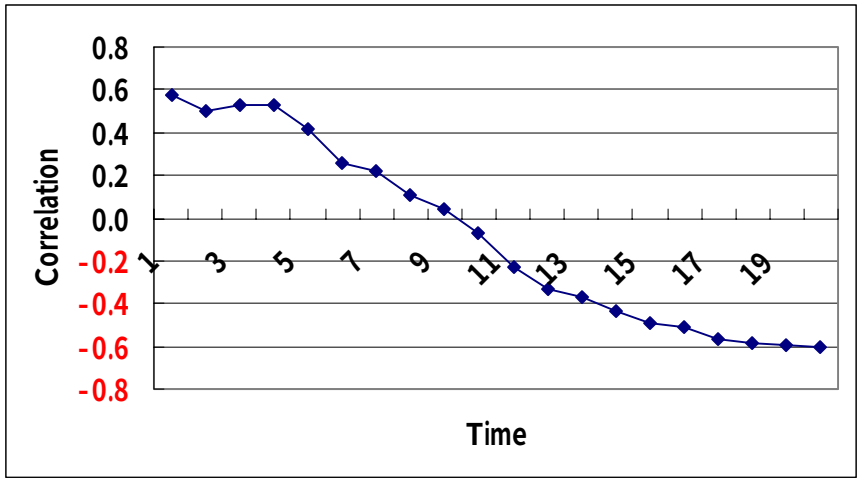
We conducted a cross-sectional regression analysis using data on various factors for individual stocks. The universe of stocks encompasses all stocks listed on exchanges or traded on the OTC market. However, to exclude stocks whose prices have likely been affected by atypical factors, we excluded from the universe those stocks with negative shareholders' equity, forecast losses, or a P/B ratio of 30 or higher. We also excluded from our analysis stocks with no earnings estimates for either the current fiscal year or the following fiscal year. The period of our analysis is every month from January 1988 to September 1999. But since the stable shareholding ratio, the unilateral shareholding

ratio, and mutual shareholding ratio are updated once a year, we use the same value for one year (January-December).

For forecast earnings, we use parent after-tax profit in the first half of the analysis and consolidated after-tax profit in the second half. Also, we use the latest forecast earnings and financial data available in each month. The figures for shareholders' equity are actual figures as of the end of the most recent fiscal year.

Next, we calculate the period that minimizes the EBO model bias. We looked at the correlation between the following fiscal year's ROE and the difference in the actual P/B ratio and the P/B ratio of calculated using the EBO model. For our calculations for the EBO model, we used a period from one year to 20 years. As shown in Figure 5, the correlation is nearly zero with a period of nine years. In other words, this period is the one in which the EBO model bias is the smallest. The value-added of high ROE companies is underestimated for periods shorter than nine years, and is overestimated for periods longer than nine years. In the following analysis, we use an EBO model with a period of nine years.[23]

Figure 5. The correlation between the following fiscal year's ROE and the difference between the actual P/B ratio and the theoretical P/B ratio



(4) Results of the analysis (1)

First, let us look at the correlation between the following fiscal year's ROE and the three measures of cross-shareholdings. As shown in Table 2, the correlation between the

[23] The bias could probably be further eliminated through a meticulous process of modeling, for each company or industry, the function showing how future value-added declines.

stable shareholding ratio and ROE is positive, while the correlation between the mutual shareholding ratio and ROE is negative. In other words, high ROE companies tend to have a high stable shareholding ratio but a low mutual shareholding ratio. The primary reason is the same type of bias in the calculation as for the P/E. Mutual shareholdings reduce the observed ROE because the increase in shareholders' equity (the denominator of the ROE) is greater than the increase in profit (the numerator). Also, the correlation between the stable shareholding ratio and the mutual shareholding ratio is negative. When the ROE is correlated with the difference between the actual P/B and the theoretical P/B, the model with a period that results in no correlation is chosen since the relationships in Table 2 are indirectly reflected in the results of the analysis.

Table 2. The correlation between the following fiscal year's ROE and measures of cross-shareholdings

Stable shareholding ratio			Unilateral shareholding ratio			Mutual shareholding ratio		
Date	Cor (Average)	Cor(March)	Date	Cor (Average)	Cor(March)	Date	Cor (Average)	Cor(March)
1988	10.2%	11.8%	1988	10.3%	11.7%	1988	-1.5%	-2.5%
1989	12.4%	10.4%	1989	6.5%	7.6%	1989	-3.2%	-0.2%
1990	10.6%	14.2%	1990	2.5%	4.1%	1990	-5.3%	-7.5%
1991	10.1%	8.1%	1991	1.8%	1.7%	1991	-7.1%	-3.9%
1992	10.3%	7.4%	1992	-2.6%	-1.8%	1992	-10.6%	-8.3%
1993	11.3%	10.7%	1993	-4.3%	-6.3%	1993	-11.1%	-12.7%
1994	7.6%	9.8%	1994	-5.0%	-5.9%	1994	-7.3%	-8.1%
1995	8.6%	12.8%	1995	-3.6%	-8.0%	1995	-6.9%	-12.7%
1996	9.3%	12.5%	1996	-3.4%	-6.1%	1996	-9.7%	-11.3%
1997	8.0%	10.2%	1997	-1.3%	-5.1%	1997	-9.3%	-10.9%
1998	5.1%	4.0%	1998	-3.5%	1.0%	1998	-6.4%	-5.5%
1999	8.0%	8.0%	1999	-6.3%	-6.2%	1999	-8.8%	-7.9%
Total	9.3%		Total	-0.6%		Total	-7.2%	

Notes: Cor(Average) is the average correlation between January and December, Cor(March) is the correlation at the end of March, and "Total" is the average for 1988 through 1999.

Table 3 shows the correlation between the theoretical P/B and the actual P/B. The regression's R^2 of 0.23 indicates that the theoretical P/B (based on an EBO model with a period of nine years) explains 23 percent of the variation in the actual P/B. The explanatory power of the theoretical P/B is greater for the 1990s, after the collapse of the economic bubble, than for the latter half of the 1980s, at the height of the economic bubble. In other words, stock prices during the economic bubble years were difficult to explain using theoretical models that factored in expected future values. In this way, even with a uniform cost of capital of 5 percent for all companies (i.e., no recognition of differences in risk premia among companies), the theoretical P/B based on a number of assumptions can explain about 25 percent of the actual P/B. The unexplained residuals

can be regarded as the differences in risk premia. Below, we analyze the extent to which the size of the firm, the sector, and the ownership structure can explain the residuals.

Table 3. The correlation between the theoretical P/B and the actual P/B

Date	Cor (Average)	Cor(March)
1988	30.0%	36.6%
1989	33.0%	31.4%
1990	45.9%	46.2%
1991	53.4%	50.4%
1992	49.3%	52.0%
1993	54.8%	49.3%
1994	55.9%	67.0%
1995	51.3%	49.6%
1996	56.4%	50.5%
1997	43.9%	59.9%
1998	44.4%	46.7%
1999	54.3%	59.9%
Total	47.6%	

Notes: Cor(Average) is the average correlation between January and December, Cor(March) is the correlation at the end of March, and "Total" is the average for all months.

To what extent can the residuals of the regression for the actual P/B and the theoretical P/B be explained by other factors? And to what extent can the size of the firm and cross-shareholdings explain the portion of the actual P/B that cannot be explained by the theoretical P/B? The three measures of cross-shareholdings we use are the stable shareholding ratio, the unilateral shareholding ratio, and the mutual shareholding ratio. The log of the market capitalization serves as a proxy variable for the impact of the size of the firm. Also, a sector dummy variable of 1 or 0 is used,[24] given the trends in P/B for different industries. The regression equation is as follows:

$$(\text{Actual P/B} - \text{theoretical P/B}) = a + b(\text{size}) + c(\text{cross-shareholdings}) + \Sigma d_i(\text{industry dummy variable})_i$$

The theoretical P/B is applied to the analysis using PBR.EBO9. Below, we show the results of our analysis using the stable shareholding ratio first and then the unilateral shareholding ratio as measures for cross-shareholdings. The financial data in the analysis are parent figures in order to allow trends over the past 10 years to be analyzed on the same basis, since consolidated figures have only become fairly common recently.

[24] The sector classifications used are the Nomura 21 sectors. Hence, there are 20 sector dummy variables. The values of the sector dummy variables have been eliminated. In the analysis in this paper, we have added the 20 sector dummy variables, but the results would not be significantly different if we did not add them.

Ten years ago, most companies provided only parent financial data, and most investors valued stocks using parent financial figures.

As evident in the results of the analysis below, the coefficient for the size of the firm is positive and statistically significant for most periods and for all the analyses. In other words, companies with large market capitalizations tend to have high P/B ratios, indicating relatively small risk premia for these companies. The coefficient was not statistically significant in 1990, possibly because the relationship between the size of the company and the P/B ratio destabilized since the year marked the end of a bull market and the start of a bear market.

The trend in the impact of cross-shareholdings differs in the three analyses. One possible factor is the impact of cross-shareholdings on the fundamentals of companies, specifically the incentives for managers. We look at this factor in detail in the next section.

As shown in Table 4, the stable shareholding ratio is statistically significant in terms of explaining the residuals, for all periods. Companies with high stable shareholding ratios tend to have high P/B ratios. Also, the R^2 has risen since 1997 because of the increased impact of the size of the firm.

Table 4. Regression analysis of the residuals (size, stable shareholding ratio)

(ActualP/B - theoreticalP/B) = a + b･(Size) + c･(Stable shareholder ratio) + Σ di･(Industry_dummy_variable)i

R-square: 11.16% Number: 2051

Date	a			b			c			R2(Average)	R2(March)
1988	-5.177	(-4.483	***)	0.474	(8.216	***)	0.041	(6.551	***)	12.63	12.99
1989	-4.306	(-3.445	***)	0.487	(8.109	***)	0.034	(5.125	***)	13.09	17.78
1990	-1.210	(-1.157	)	0.123	(2.226	)	0.045	(8.179	***)	9.39	9.96
1991	-2.117	(-2.916	***)	0.218	(6.194	***)	0.028	(7.739	***)	9.93	7.79
1992	-1.883	(-3.952	***)	0.210	(8.987	***)	0.010	(3.894	***)	9.80	7.95
1993	-1.359	(-3.040	*)	0.192	(8.560	***)	0.009	(3.670	***)	8.48	7.45
1994	-0.757	(-1.622	)	0.130	(5.431	***)	0.010	(4.022	***)	6.78	6.98
1995	-1.332	(-3.117	*)	0.152	(7.139	***)	0.008	(3.674	***)	6.32	4.18
1996	-1.459	(-3.281	***)	0.183	(8.521	***)	0.004	(1.587	)	6.48	6.28
1997	-2.898	(-8.164	***)	0.271	(16.367	***)	0.004	(2.139	*)	13.36	9.04
1998	-3.190	(-10.332	***)	0.295	(20.898	***)	0.003	(1.659	)	18.60	18.82
1999	-5.096	(-12.564	***)	0.424	(22.173	***)	0.010	(4.829	***)	22.41	25.35
Total	-2.500	(-4.641	*)	0.259	(9.929	**)	0.017	(4.412	**)		

Notes: *Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.
t-statistics and z-scores in parentheses

Notes: R^2(Average) is the average R^2 between January and December, and R^2(March) is the R^2 at the end of March.

As shown in Table 5, the unilateral shareholding ratio is statistically significant in terms of explaining the residuals in the 1980s. In this decade, the higher the unilateral shareholding ratio, the greater the positive impact on the value of the firm.

Table 5. Regression analysis of the residuals (size, unilateral shareholding ratio)

(ActualP/B - theoreticalP/B) = a + b･(Size) + c･(Unilateral shareholder ratio) + Σ di･(Industry_dummy_variable)i
R-square: 10.32% Number: 2051

Date	a		b		c		R2(Average)	R2(March)
1988	-2.739	(-2.549 **)	0.382	(6.827 ***)	0.024	(4.928 ***)	11.57	11.26
1989	-2.195	(-1.936)	0.396	(6.927 ***)	0.027	(5.277 ***)	13.16	17.66
1990	2.063	(1.925)	-0.005	(-0.039)	0.010	(2.149)	6.34	7.88
1991	-0.016	(-0.031)	0.141	(4.147 **)	0.000	(0.123)	7.10	4.96
1992	-1.142	(-2.622 *)	0.183	(8.194 ***)	-0.001	(-0.705)	9.11	7.49
1993	-0.714	(-1.741)	0.167	(7.763 ***)	0.000	(0.176)	7.82	7.26
1994	-0.001	(0.007)	0.100	(4.393 ***)	0.000	(-0.087)	5.98	6.11
1995	-0.720	(-1.848)	0.127	(6.269 ***)	0.001	(0.495)	5.75	3.57
1996	-1.210	(-2.958 **)	0.170	(8.319 ***)	0.003	(2.024)	6.56	6.22
1997	-2.640	(-8.028 ***)	0.258	(16.292 ***)	0.003	(2.241 **)	13.36	8.89
1998	-3.023	(-10.617 ***)	0.285	(21.227 ***)	0.003	(2.824 **)	18.76	18.92
1999	-4.237	(-11.396 ***)	0.389	(21.870 ***)	-0.002	(-1.106)	21.72	24.64
Total	-1.308	(-3.280)	0.212	(9.028 **)	0.006	(1.596)		

Notes: *Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.
t-statistics and z-scores in parentheses

Notes: R^2(Average) is the average R^2 between January and December, and R^2(March) is the R^2 at the end of March.

As shown in Table 6, the mutual shareholding ratio is somewhat statistically significant. Companies with a high mutual shareholding ratio tend to have a low P/B ratio, but this correlation is not as strong as the one for size of the firm.

Table 6. Regression analysis of the residuals (size, mutual shareholding ratio)

(ActualP/B - theoreticalP/B) = a + b･(Size) + c･(Mutual shareholder ratio) + Σ di･(Industry_dummy_variable)i
R-square: 10.09% Number: 2051

Date	a		b		c		R2(Average)	R2(March)
1988	-2.248	(-2.087 *)	0.374	(6.632 ***)	0.002	(0.290)	10.18	10.04
1989	-1.725	(-1.525)	0.391	(6.770 ***)	0.004	(0.725)	11.77	16.52
1990	2.256	(2.097)	-0.003	(-0.004)	-0.004	(-0.836)	6.09	7.22
1991	0.001	(-0.005)	0.145	(4.263 **)	-0.006	(-1.780)	7.26	5.39
1992	-1.160	(-2.664 **)	0.186	(8.293 ***)	-0.004	(-1.572)	9.20	7.52
1993	-0.729	(-1.778)	0.172	(7.940 ***)	-0.004	(-1.576)	7.90	7.31
1994	-0.016	(-0.029)	0.106	(4.613 ***)	-0.005	(-2.056 *)	6.18	6.58
1995	-0.725	(-1.861)	0.132	(6.496 ***)	-0.004	(-1.872 *)	5.88	3.74
1996	-1.195	(-2.919 **)	0.176	(8.514 ***)	-0.002	(-1.066)	6.43	6.36
1997	-2.613	(-7.941 ***)	0.261	(16.285 ***)	0.000	(-0.005)	13.20	8.86
1998	-2.984	(-10.472 ***)	0.285	(21.020 ***)	0.002	(1.297)	18.56	18.57
1999	-4.238	(-11.463 ***)	0.394	(22.111 ***)	-0.008	(-3.166 *)	22.05	24.98
Total	-1.206	(-3.180)	0.214	(9.086 **)	-0.002	(-0.912)		

Notes: *Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.
t-statistics and z-scores in parentheses

Notes: R^2(Average) is the average R^2 between January and December, and R^2(March) is the R^2 at the end of March.

(5) Results of the analysis (2)

Considering the possibility that the theoretical P/B based on the EBO model could be introducing bias into the results of the analysis, we did a direct regression analysis as shown below. The dependent variable in the analysis is P/B, and the independent variables are the current fiscal year's ROE, the following fiscal year's ROE, the log of the market capitalization, the cross-shareholding measure, and the sector dummy variable.

The results show that the stable shareholding ratio has a statistically significant positive impact on P/B, as does the size of the firm. These results are very similar to those of the analysis based on the PBR.EBO9 model.

Table 7. Regression analysis for P/B (current fiscal year's ROE, following fiscal year's ROE, size)

PBR＝a+bROE0+cROE1+dLN(ME)+ Σe(industry dummy variable)

R-square: 37.51% Number: 2054

Date	Intercept			ROE_PAR0			ROE_PAR1			LN(ME)		
198812	-1.756	(-1.606	)	0.075	(4.793	***)	0.061	(5.508	)	0.353	(6.206	***)
198912	-1.430	(-1.284	)	0.041	(3.517	*)	0.161	(9.548	***)	0.359	(6.310	***)
199012	2.019	(1.978	)	0.057	(3.592	*)	0.243	(12.322	***)	-0.034	(-0.608	)
199112	-0.045	(-0.064	)	0.019	(2.870	*)	0.213	(22.020	***)	0.122	(3.672	*)
199212	-1.171	(-2.724	**)	0.018	(2.626	)	0.166	(18.313	***)	0.179	(8.303	***)
199312	-0.891	(-2.222	)	-0.018	(-1.014	**)	0.237	(18.635	***)	0.167	(8.044	***)
199412	-0.166	(-0.437	)	0.032	(3.690	**)	0.202	(22.643	***)	0.102	(4.718	***)
199512	-0.477	(-1.172	)	0.019	(2.750	**)	0.153	(22.985	***)	0.120	(6.018	***)
199612	-0.866	(-2.063	*)	0.013	(1.763	***)	0.158	(21.367	***)	0.161	(7.740	***)
199712	-2.060	(-7.028	***)	0.005	(2.100	)	0.124	(24.193	***)	0.246	(17.596	***)
199812	-2.012	(-7.661	***)	0.004	(6.887	***)	0.060	(22.831	***)	0.263	(21.352	***)
199909	-3.835	(-10.126	***)	0.006	(1.563	***)	0.119	(25.629	***)	0.383	(21.409	***)
Total	-0.986	(-2.681	)	0.023	(2.963	*)	0.159	(18.659	**)	0.197	(8.918	**)

Notes:*Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.

Table 8. Regression analysis for P/B (current fiscal year's ROE, following fiscal year's ROE, size, stable shareholding ratio)

PBR＝a+bROE0+cROE1+dLN(ME) + e(stable shareholding ratio) + Σf(industry dummy variable)

R-square: 38.32% Number: 2054

Date	Intercept			ROE_PAR0			ROE_PAR1			LN(ME)			STABLE		
1988	-4.978	(-4.275	***)	0.070	(4.597	***)	0.060	(5.478	)	0.463	(7.978	***)	0.046	(7.295	***)
1989	-4.017	(-3.267	***)	0.041	(3.507	*)	0.153	(9.145	***)	0.453	(7.651	***)	0.035	(5.350	***)
1990	-0.938	(-0.887	)	0.058	(3.695	**)	0.228	(11.677	***)	0.078	(1.463	)	0.040	(7.287	***)
1991	-1.913	(-2.667	**)	0.020	(2.981	*)	0.204	(21.137	***)	0.192	(5.553	***)	0.026	(7.073	***)
1992	-1.755	(-3.757	***)	0.017	(2.572	)	0.164	(18.012	***)	0.202	(8.920	***)	0.008	(3.305	***)
1993	-1.172	(-2.711	*)	-0.018	(-1.011	**)	0.235	(18.424	***)	0.178	(8.195	***)	0.004	(1.714	)
1994	-0.571	(-1.300	)	0.031	(3.580	**)	0.200	(22.473	***)	0.118	(5.191	***)	0.005	(2.275	**)
1995	-0.880	(-2.050	)	0.018	(2.677	**)	0.152	(22.863	***)	0.136	(6.508	***)	0.005	(2.538	**)
1996	-0.941	(-2.075	*)	0.013	(1.758	***)	0.158	(21.306	***)	0.164	(7.482	***)	0.001	(0.443	)
1997	-2.349	(-7.494	***)	0.005	(2.143	)	0.123	(23.956	***)	0.257	(17.581	***)	0.004	(2.574	)
1998	-2.434	(-8.581	***)	0.005	(7.118	***)	0.059	(22.469	***)	0.279	(21.530	***)	0.006	(3.868	***)
1999	-4.741	(-11.473	***)	0.006	(1.646	***)	0.117	(25.279	***)	0.422	(21.952	***)	0.012	(5.378	***)
Total	-2.160	(-4.025	)	0.023	(2.972	*)	0.156	(18.345	**)	0.241	(9.694	**)	0.016	(4.059	*)

Notes:*Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.

Table 9. Regression analysis for P/B (current fiscal year's ROE, following fiscal year's ROE, size, mutual shareholding ratio)

PBR＝a+bROE0+cROE1+dLN(ME)+e unilateral shareholding ratio+ Σf(industry dummy variable)

R-square: 37.87% Number: 2054

Date	Intercept			ROE_PAR0			ROE_PAR1			LN(ME)			Unilateral		
1988	-2.280	(-2.094	*)	0.072	(4.723	***)	0.061	(5.473	)	0.361	(6.392	***)	0.027	(5.457	***)
1989	-1.910	(-1.710	)	0.043	(3.639	*)	0.156	(9.342	***)	0.360	(6.392	***)	0.029	(5.819	***)
1990	1.828	(1.803	)	0.056	(3.520	*)	0.244	(12.386	***)	-0.034	(-0.596	)	0.012	(2.496	)
1991	-0.071	(-0.101	)	0.018	(2.852	*)	0.213	(22.020	***)	0.122	(3.663	*)	0.002	(0.661	)
1992	-1.160	(-2.696	**)	0.018	(2.641	)	0.166	(18.276	***)	0.180	(8.307	***)	-0.001	(-0.419	)
1993	-0.899	(-2.240	)	-0.019	(-1.049	**)	0.238	(18.643	***)	0.166	(7.980	***)	0.001	(0.697	)
1994	-0.201	(-0.520	)	0.032	(3.696	**)	0.202	(22.683	***)	0.101	(4.651	***)	0.003	(1.640	)
1995	-0.502	(-1.235	)	0.019	(2.784	**)	0.153	(23.022	***)	0.119	(5.934	***)	0.003	(1.541	)
1996	-0.912	(-2.178	*)	0.013	(1.761	***)	0.159	(21.497	***)	0.157	(7.563	***)	0.005	(3.072	**)
1997	-2.092	(-7.138	***)	0.005	(2.097	)	0.124	(24.263	***)	0.243	(17.393	***)	0.003	(2.517	**)
1998	-2.029	(-7.720	***)	0.004	(6.890	***)	0.060	(22.893	***)	0.262	(21.176	***)	0.002	(1.581	)
1999	-3.775	(-9.948	***)	0.006	(1.541	***)	0.119	(25.590	***)	0.382	(21.388	***)	-0.002	(-1.300	)
Total	-1.100	(-2.803	)	0.023	(2.960	*)	0.159	(18.668	**)	0.197	(8.874	**)	0.007	(2.064	)

Notes:*Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.

Table 10. Regression analysis for P/B (current fiscal year's ROE, following fiscal year's ROE, size, unilateral shareholding ratio)

PBR＝a+bROE0+cROE1+dLN(ME)+e mutual shareholding ratio + Σf(industry dummy variable)

R-square: 37.56% Number: 2054

Date	Intercept			ROE_PAR0			ROE_PAR1			LN(ME)			Mutual		
1988	-1.752	(-1.601	)	0.075	(4.779	***)	0.061	(5.512	)	0.353	(6.199	***)	0.000	(-0.046	)
1989	-1.444	(-1.297	)	0.041	(3.543	*)	0.162	(9.557	***)	0.356	(6.246	***)	0.004	(0.698	)
1990	2.025	(1.983	)	0.058	(3.605	*)	0.243	(12.264	***)	-0.034	(-0.602	)	-0.001	(-0.144	)
1991	-0.029	(-0.042	)	0.019	(2.862	*)	0.212	(21.906	***)	0.125	(3.743	*)	-0.005	(-1.230	)
1992	-1.167	(-2.714	**)	0.018	(2.621	)	0.166	(18.218	***)	0.181	(8.338	***)	-0.002	(-0.792	)
1993	-0.891	(-2.221	)	-0.018	(-1.013	**)	0.237	(18.589	***)	0.167	(7.975	***)	0.000	(-0.038	)
1994	-0.168	(-0.440	)	0.032	(3.680	**)	0.201	(22.559	***)	0.104	(4.739	***)	-0.001	(-0.466	)
1995	-0.479	(-1.176	)	0.019	(2.718	**)	0.153	(22.926	***)	0.122	(6.075	***)	-0.002	(-0.854	)
1996	-0.864	(-2.059	*)	0.013	(1.769	***)	0.158	(21.313	***)	0.161	(7.633	***)	0.000	(0.162	)
1997	-2.061	(-7.027	***)	0.005	(2.094	)	0.124	(24.114	***)	0.246	(17.370	***)	0.000	(0.091	)
1998	-2.018	(-7.682	***)	0.004	(6.909	***)	0.060	(22.691	***)	0.266	(21.287	***)	-0.002	(-1.201	)
1999	-3.763	(-9.982	***)	0.006	(1.616	***)	0.118	(25.335	***)	0.389	(21.729	***)	-0.010	(-4.107	*)
Total	-0.981	(-2.672	)	0.023	(2.966	*)	0.159	(18.580	**)	0.198	(8.907	**)	-0.001	(-0.572	)

Notes:*Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.

(6) Results of the analysis (3)

The analysis so far has focused on all stocks traded on the exchanges or on the OTC market. We then tried using the same type of analysis as in the section "results of the analysis (1)," but limited the universe of stocks to those on the first section of the Tokyo Stock Exchange. The results for all three measures of cross-shareholdings, which are shown below, are similar to those in the "results of the analysis (1)" and the "results of the analysis (2)."

To summarize the results of the analysis so far, companies with a high stable shareholding ratio tend to have a high P/B ratio. This trend does not only indirectly indicate the tendency of high ROE companies to have high stable shareholding ratios.

At the same time, the analysis does not indicate that a high mutual shareholding ratio lowers a company's P/B ratio. The unilateral shareholding ratio has characteristics that fall somewhere between those of the stable shareholding ratio and the mutual shareholding ratio, and accordingly does not show any particularly significant correlation with the P/B ratio. The impact of the mutual shareholding ratio and the unilateral shareholding ratio on the pricing of stocks was thus not evident to any significant extent. The stable shareholding ratio, however, showed a significant positive correlation with the P/B ratio, even excluding the theoretical bias relating to ROE.

Table 11. Regression analysis of the residuals, using TSE first-section stocks (size, stable shareholding ratio)

(PBR_PAR - PBR.EBO9) = a + b･LN(ME) + c･STABLE
R-square: 6.42% Number: 992

Date	a			b			c			R2(Average)	R2(March)
1988	-2.375	(-2.112	)	0.305	(3.668	*)	0.051	(5.604	***)	4.52	6.08
1989	0.235	(0.154	)	0.160	(1.716	)	0.049	(4.765	***)	2.71	3.11
1990	3.015	(2.420	)	-0.142	(-1.557	)	0.042	(4.953	***)	3.12	3.19
1991	0.710	(0.945	)	0.034	(0.741	)	0.020	(3.574	***)	1.45	1.93
1992	-0.179	(-0.586	)	0.112	(3.432	*)	0.002	(0.571	)	1.39	0.25
1993	-0.074	(-0.312	)	0.104	(3.585	*)	0.005	(1.391	)	1.92	1.51
1994	0.028	(0.042	)	0.092	(3.066	*)	0.007	(1.942	*)	1.55	0.66
1995	-0.469	(-1.256	)	0.103	(3.556	***)	0.007	(1.990	)	1.62	1.76
1996	-0.234	(-0.712	)	0.103	(3.581	***)	0.007	(2.026	*)	1.66	0.93
1997	-2.818	(-10.250	***)	0.272	(12.885	***)	0.008	(3.195	*)	13.99	8.47
1998	-3.324	(-15.301	***)	0.311	(18.613	***)	0.005	(2.332	**)	25.10	20.66
1999	-4.550	(-13.867	***)	0.427	(16.988	***)	0.009	(2.995	**)	22.93	29.21
Total	-0.741	(-3.135	)	0.150	(5.571	*)	0.018	(2.944	)		

Notes: *Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.
t-statistics and z-scores in parentheses

Table 12. Regression analysis of the residuals, using TSE first-section stocks (size, unilateral shareholding ratio)

(PBR_PAR - PBR.EBO9) = a + b･LN(ME) + c･Unilateral
R-square: 5.86% Number: 992

Date	a			b			c			R2(Average)	R2(March)
1988	-0.793	(-0.759	)	0.295	(3.509	*)	0.028	(3.939	***)	2.86	3.88
1989	1.662	(1.323	)	0.149	(1.585	)	0.031	(3.799	***)	1.87	2.62
1990	4.774	(4.274	**)	-0.167	(-1.862	)	0.016	(2.272	*)	1.28	2.13
1991	1.447	(2.095	)	0.025	(0.585	)	0.009	(2.215	*)	0.71	0.77
1992	0.019	(-0.120	)	0.107	(3.274	*)	-0.001	(-0.535	)	1.41	0.38
1993	0.044	(-0.025	)	0.103	(3.563	*)	0.003	(1.256	)	1.91	1.63
1994	0.155	(0.373	)	0.093	(3.077	*)	0.005	(1.995	*)	1.55	0.81
1995	-0.255	(-0.749	)	0.102	(3.491	***)	0.003	(1.283	)	1.39	1.49
1996	-0.106	(-0.409	)	0.103	(3.591	***)	0.005	(1.974	*)	1.64	0.79
1997	-2.542	(-9.968	***)	0.270	(12.738	***)	0.004	(1.875	)	13.41	8.36
1998	-3.163	(-15.790	***)	0.310	(18.481	***)	0.002	(1.456	)	24.84	20.11
1999	-3.891	(-12.798	***)	0.411	(16.268	***)	-0.003	(-0.927	)	22.43	28.79
Total	-0.126	(-2.454	)	0.143	(5.420	*)	0.009	(1.785	)		

Notes: *Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.
t-statistics and z-scores in parentheses

Table 13. Regression analysis of the residuals, using TSE first-section stocks (size, mutual shareholding ratio)

(PBR_PAR - PBR.EBO9) = a + b･LN(ME) + c･Mutual
R-square: 5.49% Number: 992

Date	a			b			c			R2(Average)	R2(March)
1988	0.659	(0.601	)	0.250	(2.977	*)	0.002	(0.246	)	1.22	2.15
1989	3.149	(2.601	)	0.105	(1.125	)	0.005	(0.503	)	0.43	1.25
1990	5.645	(5.251	**)	-0.195	(-2.190	)	0.001	(0.121	)	0.74	1.40
1991	2.067	(3.173	)	0.008	(0.242	)	-0.004	(-0.725	)	0.26	0.56
1992	0.114	(0.101	)	0.105	(3.243	*)	-0.005	(-1.685	)	1.67	0.65
1993	0.278	(0.618	)	0.097	(3.370	)	-0.002	(-0.812	)	1.78	1.58
1994	0.450	(1.166	)	0.085	(2.829	*)	-0.001	(-0.342	)	1.15	0.62
1995	0.061	(0.101	)	0.093	(3.229	***)	-0.005	(-1.553	)	1.49	1.42
1996	0.259	(0.551	)	0.093	(3.274	**)	-0.003	(-1.036	)	1.38	0.52
1997	-2.314	(-9.350	***)	0.265	(12.464	***)	-0.001	(-0.630	)	13.19	8.41
1998	-2.994	(-15.370	***)	0.305	(18.213	***)	-0.002	(-0.905	)	24.74	19.85
1999	-3.666	(-12.413	***)	0.401	(15.983	***)	-0.010	(-3.348	**)	23.13	29.48
Total	0.411	(-1.645	)	0.128	(5.125	)	-0.002	(-0.783	)		

Notes: *Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.
t-statistics and z-scores in parentheses

7. Cross-shareholdings and corporate governance

Cross-shareholdings, which include shares held by a company's own executives as well as shares held by major shareholders and institutional investors, serve to impose discipline upon executives. However, cross-shareholdings can either strengthen or weaken the degree of control over managers. Cross-shareholdings can potentially strengthen shareholder control over corporations since institutional investors and other major shareholders generally have the incentive and ability to monitor executives.[25] But when major shareholders have close business ties with their cross-shareholding counterparts, these large shareholders may become overly supportive of executives, and thus function poorly as monitors of corporate managers. In Japan, a nonlinear relationship exists between the ratio of shares held by company executives and the value of a company.[26] An increase in the proportion of shares owned by company managers can increase the value of a company since it aligns the interests of managers with those of outside shareholders.[27] But a rise in the percentage of shares held by managers and shareholders supportive of managers could serve to shield executives from outside shareholders. The resultant stable position of managers enhances the incentive for them to maximize their own interests rather than the value of the company. Morck, Shleifer & Vishny (1988) and Tejima (2000) conducted empirical studies to see which factor—the alignment of the interests of managers and shareholders, or the protection of

[25] McConnell & Servaes (1990).
[26] Tejima (2000).
[27] Berle & Means (1932) and Jensen & Meckling (1976).

managers—tends to dominate.

The three ratios defined earlier are measures of cross-shareholdings. Among the three, only the stable shareholding ratio includes shares owned by managers. Higher stable shareholding ratios tend to increase the value of a company since the interests of managers and those of outside shareholders are closely aligned, as shown in the analysis in the previous section. But the risk exists that corporate governance may be inadequate at companies with relatively high stable shareholding ratios. When the market regards a high stable shareholding ratio negatively, in terms of shielding corporate managers from potentially unfriendly shareholders, a comparatively high ratio may reduce the value of a company. The earlier analysis of all publicly traded Japanese companies showed that high stable shareholding ratios had a positive impact on the value of a company, suggesting that the value of a company would be hurt only if the stable shareholding ratio were very high.

The mutual shareholding ratio, on the other hand, measures the degree to which a pure cross-shareholding relationship exists since it excludes nearly all shares owned by executives. This ratio is highly correlated with the ratio of shares owned by financial institutions. It is possible that corporate governance is inadequate at companies with relatively high mutual shareholding ratios. To confirm the results of the analysis in the previous section, the mutual shareholding ratio has a negative impact on the value of a company, in our PBR.EBO9 model.

Finally, the unilateral shareholding ratio is a mediocre measure of the extent of corporate governance. The convergence of interests is weak because managers do not own a stake, and has less of an impact than the mutual shareholding ratio does in protecting management because unilateral shareholdings encompass more than just mutual shareholdings.

Hence, strong incentives for managers could have an impact on the value of a company. Tejima (2000) uses shares owned by management rather than the stable shareholding ratio as an indicator in his analysis.

8. The relationship between analysts' estimates and cross-shareholdings

Analysts tend to more fully incorporate management incentives into their earnings forecasts for the next fiscal year and beyond than for the current fiscal year. Analysts' earnings estimates for the current year are for profits generated from existing businesses and therefore do not need to take into consideration management incentives and corporate governance issues. Earnings forecasts for the next fiscal year and beyond, in contrast, should incorporate the ability of a company to generate value added through

new projects because it is difficult for a company to increase profits over the long run simply by maintaining its existing operations. Management incentives and oversight by outside shareholders are very important factors in determining the ability of a company to generate value over the longer term. Given the low accuracy of earnings forecasts for the following fiscal year, these estimates most likely incorporate assessments of the ownership structure and other structural factors. In other words, analysts can for the most part ignore the impact of cross-shareholdings in their earnings forecasts for the following fiscal year. We now explain the above points based on the following data.

Table 14. Differences between earnings forecasts for the current fiscal year and the following fiscal year

Correlation between current FY theoretical PBR (N=9) and actual P/B

Date	Cor (Average)	Cor(March)
1988	27.7%	37.2%
1989	29.7%	23.8%
1990	37.5%	41.0%
1991	44.3%	42.9%
1992	39.1%	37.7%
1993	40.0%	36.1%
1994	43.6%	44.4%
1995	36.8%	30.7%
1996	40.2%	44.9%
1997	37.9%	48.1%
1998	33.0%	35.6%
1999	40.3%	47.2%
Total	37.4%	

Correlation between unilateral shareholding ratio and current FY ROE

Date	Cor (Average)	Cor(March)
1988	9.1%	6.9%
1989	8.1%	9.5%
1990	3.7%	6.3%
1991	0.8%	1.5%
1992	-1.5%	-0.6%
1993	-2.3%	-3.3%
1994	-2.4%	1.3%
1995	-6.1%	-6.7%
1996	-2.8%	-6.4%
1997	0.4%	-0.3%
1998	-3.2%	1.2%
1999	-5.2%	-4.7%
Total	0.0%	

Correlation between stable shareholding ratio and current FY ROE

Date	Cor (Average)	Cor(March)
1988	9.5%	9.7%
1989	13.3%	12.1%
1990	9.9%	12.5%
1991	6.8%	6.1%
1992	3.4%	2.0%
1993	7.0%	3.0%
1994	5.7%	2.7%
1995	7.1%	10.0%
1996	7.0%	9.5%
1997	3.9%	4.8%
1998	1.9%	2.1%
1999	6.0%	5.9%
Total	6.8%	

Correlation between mutual shareholding ratio and current FY ROE

Date	Cor (Average)	Cor(March)
1988	-2.3%	-4.8%
1989	-1.6%	3.7%
1990	-3.3%	-5.5%
1991	-3.7%	-3.3%
1992	-3.8%	-0.1%
1993	-5.9%	-5.4%
1994	-3.2%	-3.0%
1995	-7.1%	-8.3%
1996	-7.0%	-8.4%
1997	-4.3%	-6.0%
1998	-4.3%	-4.0%
1999	-5.5%	-4.3%
Total	-4.3%	

First, the correlation between the current fiscal year's ROE and the cross-shareholding measure (Table 14) is weaker than the correlation between the following fiscal year's ROE and the cross-shareholding measure (Table 2). Hence, it is possible that equity analysts include information on the ownership structure of companies in their estimates for the following fiscal year more so than for the current fiscal year.

Second, the theoretical P/B based on the current fiscal year's ROE (N = 9) (Table 14) has less explanatory power for the actual P/B than does the theoretical P/B based on the following fiscal year's ROE (N = 9) (Table 3). Accordingly, investors may be focusing more on estimates for the following fiscal year than on estimates for the current fiscal year.

Because investors value stocks primarily on the basis of earnings estimates for the following fiscal year, a company's ownership structure is already discounted to some degree in the fair value of a stock. As evident in the significance of the stable shareholding ratio shown in the previous analysis, however, it is likely that investors consider not only basic stock valuation metrics but also such factors as the impact of stable shareholders when valuing stocks.

9. Results based on consolidated accounting

Our analysis so far has been based on parent financial data. With the ongoing harmonization of accounting standards worldwide, investors are increasingly focusing on consolidated financial data. The correlation between theoretical P/B ratios based on consolidated figures and observed P/B ratios has been increasing each year, more so than the corresponding correlation for parent P/B ratios has (Table 3).

Table 15. The correlation between the theoretical P/B and the actual P/B based on consolidated financial data

Date	Cor (Average)	Cor(March)
1988	37.4%	44.7%
1989	38.1%	37.6%
1990	47.6%	46.0%
1991	53.8%	48.9%
1992	50.3%	54.1%
1993	56.0%	46.0%
1994	57.7%	69.2%
1995	49.3%	48.9%
1996	56.6%	56.8%
1997	47.1%	62.3%
1998	52.3%	50.7%
1999	56.0%	60.0%
Total	50.0%	

Tables 16-18 show the results of our regression analysis for residuals based on consolidated financial data. The trends are similar to those for our analyses based on parent financial data. The explanatory power of the residuals declines for consolidated financial data because the theoretical P/B based on consolidated data better explains the

actual P/B. Also, consistent in all the results is the significant difference in the impact of the size of the firm, both before 1996 and after 1996. Since 1996, the stable shareholding ratio has lost significance, in part because of a rise in corporate default risk. It is likely that investors, in seeking to avoid companies with significant default risk, have come to find greater value in large corporations than smaller companies with relatively high stable shareholding ratios and which are heavily owned by the founders.

Table 16. Regression analysis of the residuals based on consolidated financial data

(size, stable shareholding ratio)

(PBR_CON - PBR.EBO9) = a + b･LN(ME) + c･STABLE
R-square: 4.62% Number: 2014

Date	a		b		c		R2(Average)	R2(March)
1988	-2.994	(-3.945 ***)	0.380	(6.893 ***)	0.040	(6.269 ***)	4.45	4.92
1989	-2.205	(-2.777 *)	0.378	(6.680 ***)	0.033	(5.110 ***)	3.41	5.46
1990	0.694	(0.774)	0.015	(0.330)	0.046	(8.294 ***)	4.02	3.75
1991	-1.524	(-3.312 **)	0.171	(5.061 ***)	0.030	(8.072 ***)	3.90	3.38
1992	-1.277	(-4.162 ***)	0.163	(7.086 ***)	0.010	(3.883 ***)	2.90	1.83
1993	-0.916	(-3.083)	0.151	(6.784 ***)	0.009	(3.704 ***)	2.80	2.60
1994	0.003	(-0.076)	0.084	(3.745 *)	0.009	(3.444 ***)	1.57	2.16
1995	-0.623	(-2.495)	0.105	(5.382 **)	0.008	(3.527 ***)	1.81	0.69
1996	-0.537	(-2.010)	0.130	(6.452 ***)	0.004	(1.895 *)	1.86	1.86
1997	-1.970	(-9.297 ***)	0.212	(13.194 ***)	0.003	(1.687)	6.93	3.79
1998	-2.429	(-13.169 ***)	0.233	(16.741 ***)	0.003	(1.573)	11.21	10.07
1999	-3.750	(-14.624 ***)	0.355	(18.319 ***)	0.010	(4.612)	13.06	14.28
Total	-1.402	(-4.597 *)	0.194	(7.793 **)	0.017	(4.332 **)		

Notes: *Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.
t-statistics and z-scores in parentheses

Table 17. Regression analysis of the residuals based on consolidated financial data

(size, unilateral shareholding ratio)

(PBR_CON - PBR.EBO9) = a + b･LN(ME) + c･Unilateral
R-square: 3.72% Number: 2014

Date	a		b		c		R2(Average)	R2(March)
1988	-0.794	(-1.285)	0.300	(5.594 ***)	0.020	(4.235 ***)	3.14	3.33
1989	-0.463	(-0.791)	0.299	(5.520 ***)	0.025	(5.198 ***)	3.44	5.51
1990	4.160	(6.671 ***)	-0.100	(-1.857)	0.006	(1.034)	0.56	0.95
1991	1.009	(2.407)	0.094	(2.929)	-0.003	(-1.164)	0.71	0.15
1992	-0.394	(-1.799)	0.137	(6.243 ***)	-0.003	(-1.383)	2.23	1.38
1993	-0.170	(-0.800)	0.127	(5.939 ***)	0.000	(-0.203)	2.14	2.21
1994	0.739	(2.914 **)	0.062	(2.878)	-0.001	(-0.673)	1.01	1.87
1995	-0.023	(-0.390 *)	0.083	(4.488)	0.001	(0.739)	1.28	0.02
1996	-0.268	(-1.374)	0.114	(5.988 ***)	0.004	(2.383 *)	1.95	1.73
1997	-1.793	(-11.417 ***)	0.201	(13.081 ***)	0.003	(2.376 **)	7.02	3.83
1998	-2.291	(-17.346 ***)	0.223	(16.906 ***)	0.003	(2.917 **)	11.45	10.54
1999	-2.828	(-15.238 ***)	0.322	(17.821 ***)	-0.002	(-1.410)	12.28	13.49
Total	-0.194	(-2.895)	0.151	(6.853 *)	0.005	(1.237)		

Notes: *Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.
t-statistics and z-scores in parentheses

Table 18. Regression analysis of the residuals based on consolidated financial data

(size, mutual shareholding ratio)

(PBR_CON - PBR.EBO9) = a + b･LN(ME) + c･Mutual
R-square: 3.57% Number: 2014

Date	a		b		c		R2(Average)	R2(March)
1988	-0.094	(-0.175)	0.290	(5.384 ***)	0.005	(0.796)	2.04	2.02
1989	0.302	(0.410)	0.290	(5.310 ***)	0.009	(1.534)	2.04	4.12
1990	4.426	(7.208 ***)	-0.098	(-1.807)	-0.005	(-1.072)	0.47	0.51
1991	1.044	(2.539)	0.100	(3.083 *)	-0.010	(-2.703 *)	1.02	0.75
1992	-0.429	(-1.972)	0.139	(6.310 ***)	-0.004	(-1.499)	2.24	1.22
1993	-0.132	(-0.657)	0.131	(6.141 ***)	-0.005	(-2.123 *)	2.32	2.47
1994	0.776	(3.113 **)	0.066	(3.093)	-0.006	(-2.738 **)	1.40	2.91
1995	0.025	(-0.149)	0.087	(4.689 *)	-0.003	(-1.484)	1.33	0.20
1996	-0.180	(-0.962)	0.120	(6.209 ***)	-0.002	(-0.789)	1.73	1.75
1997	-1.722	(-11.119 ***)	0.205	(13.241 ***)	-0.001	(-0.463)	6.83	3.72
1998	-2.242	(-17.187 ***)	0.222	(16.782 ***)	0.003	(1.898 *)	11.25	10.05
1999	-2.779	(-15.333 ***)	0.325	(18.074 ***)	-0.010	(-4.018 *)	12.98	14.11
Total	-0.015	(-2.537)	0.152	(6.931 **)	-0.002	(-0.979)		

Notes: *Significant at the 90% level.
**Significant at the 95% level.
***Significant at the 99% level.
t-statistics and z-scores in parenthese

10. Conclusion

The stable shareholding ratio in Japan stood at 44.1 percent as of the end of March 1999 (for stocks on the first section of the Tokyo Stock Exchange), the unilateral shareholding ratio at 28.2 percent, and the mutual shareholding ratio at 16.3 percent. Given the diminishing benefits of cross-shareholdings, financial institutions and companies increasingly unwound their cross-shareholdings in the 1990s, and at a particularly rapid pace since 1998.

Our analysis comes to several conclusions on cross-shareholdings in perfect capital markets. First, cross-shareholdings have a neutral impact on stock prices when there is no impact on companies' fundamentals. Second, P/Es are sometimes deflated and other times inflated by cross-shareholdings and the dividend payout ratio. In much the same way, cross-shareholdings distort ROEs, stock returns, and leverage. Third, contributing factors to a high P/B ratio include a high stable shareholding ratio and a large market capitalization, according to the EBO model. These trends more or less hold even if a different model, universe of stocks, or financial criteria are used. Fourth, by affecting companies' fundamentals, cross-shareholdings could affect the pricing of stocks. In other words, companies with a high stable shareholding ratio tend to have a high value. For instance, a company's value tends to be enhanced when managers own shares or many of the shareholders are subsidiaries. On the other hand, mutual shareholding tends to have a significant negative impact on a company's value. These types of changes in the value of a company as a result of differences in the ownership

structure are related to the incentives that managers are presented with. Fifth, given the increasing difficulty of forecasting earnings as the time horizon lengthens, equity analysts might incorporate into their estimates for the following fiscal year rather than the current fiscal year their projected impact of structural factors on the value of a company. The results of the analysis in this paper suggest that investors act on the basis of earnings estimates for the following fiscal year rather than estimates for the current fiscal year. Finally, earnings estimates for the following fiscal year, rather than estimates for the current fiscal year, discount trends in the ownership structure, albeit modestly.

The significance of the stable shareholding ratio has diminished since 1996. One reason is that default risk (credit risk) has risen. Market capitalization (size of the firm) is very significant in terms of explaining the residuals. So as to avoid default risk, investors have found greater value in large companies rather than small companies that are heavily owned by the founders. The analysis in this paper used a uniform risk premium, but corporate governance risk and credit risk have become increasingly recognized by investors as important factors in valuing stocks and companies.

Ultimately, the decision whether to consider the impact of cross-shareholdings on stock valuations depends on the valuation measures used by investors. Given that the share of Japanese stocks owned by foreign investors in value terms had risen to 18.6 percent as of the end of March 2000, the measures by which stocks are being valued have been changing somewhat. Although it is difficult to directly incorporate cross-shareholdings into stock valuations, the analysis in this paper suggests that cross-shareholdings could become an important factor in estimating the value-added likely to be generated by companies in the future.

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