Cross-Shareholdings and Japanese Benchmark Stock Indexes

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Abstract

1. Cross-shareholdings—or those shares that are cross-owned for strategic purposes by non-financial companies and their main banks, or among companies in the same *keiretsu* corporate groupings—account for a large proportion of the shares in Japan's stock market as well as those shares that are not held for investment purposes. These shares that are not owned for the purpose of generating income or capital gains also include shares of a publicly traded subsidiary owned by the parent company (for example, NTT's large stake in NTT DoCoMo), shares owned by the government, and shares owned by company founders and top executives. As passive fund management becomes increasingly efficient through lower tracking error and costs, an increasing proportion of assets—starting with those from large pension funds and postal savings, postal life insurance and other public sources—is likely to be passively managed.
2. The most widely used domestic benchmark index for Japanese investors is the TOPIX index, which by definition automatically includes all stocks that trade on the first section of the Tokyo Stock Exchange.
3. One market topic of much debate in Japan since 2000 is whether cross-shareholdings and other types of shares held for non-investment purposes have led to distortions in Japan's market. One argument that has been made, for instance, is that the many stable shareholdings have led to a shortage in the supply of shares relative to demand from active fund managers, and thus distortions in share prices, since the stocks in the TOPIX index are included at proportions higher than their actual free floats.
4. This paper presents a quantitative model that shows a significant difference between the investable shares in the market and the shares that are included in the TOPIX benchmark index. The impact of this divergence can be expected to increase as the proportion of passively managed assets increases, assuming that proportions of stable shareholdings stay at roughly current levels. At the individual stock level, the

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distortions in supply and demand are significant in many cases, leading to greater demand than supply for some stocks and greater supply than demand for others. Over the past 20 years, the impact of these distortions has increased. For instance, stocks with high proportions of stable shareholdings have been affected by a decline in trading volume and an increase in volatility.

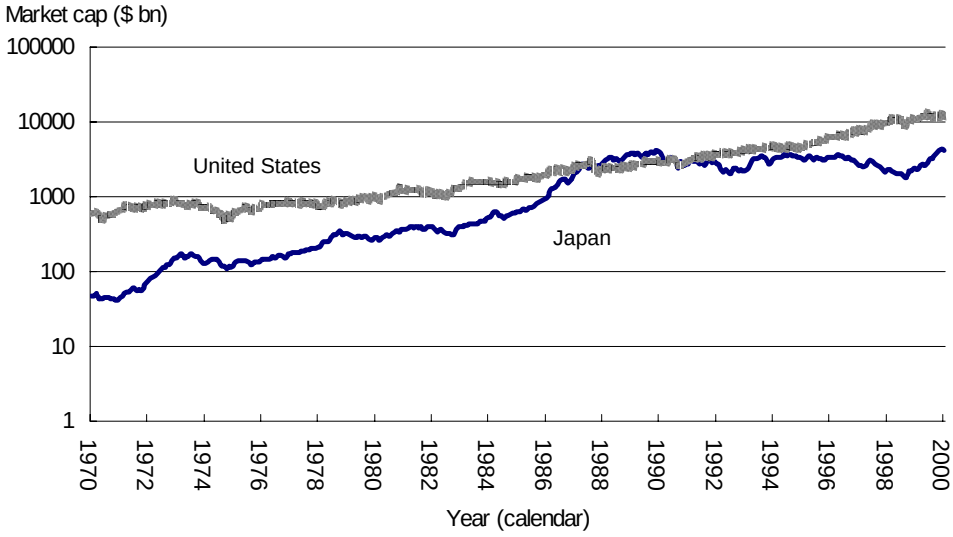
5. The divergence between the investable shares in the market and the shares that are included in the TOPIX index not only distorts the supply and demand for stocks but also significantly affects the evaluation of fund managers' performance. The differences in the free floats of stocks are not likely to narrow significantly in the next few years given the likelihood of an increasing number of listed stocks of parent/subsidiary pairs and companies heavily owned by insiders, even as banks, non-financial companies, and *keiretsu* group members increasingly unwind their cross-shareholdings. Meanwhile, managers of large public funds in Japan are increasingly opting for a passive investment approach, a development which makes it more and more critical to have a benchmark index that takes into account stable shareholdings.

A comparison of the stock markets in Japan and the United States

The foundation of Japan's economy today was established during the high-growth period from the early 1950s (after the postwar reconstruction years) to the early 1970's, when GDP growth consistently ranged between 10 and 20 percent. Then starting in the mid-1970s, Japan's economy downshifted to a lower rate of growth.

It was during this period of slower economic growth that Japan's stock market took off and became a major international financial market. At the end of 1975, the total market value of stocks listed on the Tokyo Stock Exchange (TSE)—still the most well-known exchange in Japan and also the largest in terms of trading volume—amounted to $136 billion, not even 20 percent of the $685.1 billion market value of stocks listed on the New York Stock Exchange (NYSE) at the time. Over the following dozen or so years, Japan's stock market and other capital markets quickly developed and grew in size. By April 1987—at the height of Japan's economic bubble years—the value of stocks on the TSE had roughly matched the value of stocks on the NYSE. The asset bubble in Japan soon popped, and the stock market hardly grew at all in the 1990s, while the U.S. stock market took off. By January 2000, the total value of stocks on the TSE had dropped to just over $4 trillion, or about 36 percent of the value of stocks on the NYSE.

Figure 1. Comparison of the total value of stocks on the TSE and NYSE, 1970-2000



Notes: Market values were calculated based on exchange statistics; the dollar values for the TSE were calculated using month-end exchange rates published by the Bank of Japan

To analyze the liquidity and other aspects of the TSE and NYSE, we calculated the mean and standard deviation for market value, the value of trading, and turnover for four five-year periods between 1979 and 1999: October 1979 to September 1984 (post-high-growth period), October 1984 to September 1989 (the economic bubble years), October 1989 to September 1994 (the first half of the post-bubble years), and October 1994 to September 1999 (the second half of the post-bubble years).

Figure 2. Comparison of market values and trading on the TSE and NYSE

		Japan (TSE)			U.S. (NYSE)		
		Market value	Value of trading	Turnover	Market value	Value of trading	Turnover
10/79-9/84	Mean	394	193	49.2	1,257	533	41.2
	Standard deviation	94	60	12.0	221	205	10.0
10/84-9/89	Mean	2,174	1,392	60.2	2,283	1,385	60.1
	Standard deviation	1,132	901	18.4	394	383	11.4
10/89-9/94	Mean	2,972	901	29.3	3,683	1,820	49.0
	Standard deviation	509	504	12.4	634	466	6.6
10/94-9/99	Mean	2,864	899	31.8	8,130	5,490	65.8
	Standard deviation	505	290	9.4	2,415	2,167	9.1

Notes: Units are billion dollars, except for percent in the case of turnover; the mean was calculated from the high and low for each year from January 1977 to January 2000; the dollar values for the market value and value of trading on the TSE were calculated using month-end exchange rates published by the Bank of Japan

The TSE was still small in scale in the first period, but then grew significantly in the second period. During these first two periods, when the TSE was expanding, the market's turnover was 50-60 percent, on par with that of the NYSE. Turnover on the TSE then fell to around 30 percent in the third period, after the collapse of the economic bubble. Both the turnover and the market value of stocks on the TSE changed little in the fourth period compared with the third.

In contrast, growth in the market value of stocks on the NYSE was steady over the four periods, and turnover stayed high. Both the market value and turnover were at their highest in the fourth period. Turnover in Japan remains significantly lower than in the United States, especially considering the pickup in stock trading in the 1990s in conjunction with the growth in regional exchanges and third markets in Japan.

A breakdown of stock ownership by type of investor in both countries shows interesting differences. Individuals, pensions and other retirement plans, and mutual funds—whose assets are effectively owned by the household sector—accounted for a combined 82 percent of the U.S. market as of the end of June 1999. In contrast, these three groups of investors account for only 25 percent of Japan's market, although some of the difference may be due to differences in the way the statistics are compiled. The major investor groups in Japan are all companies, which tend to own shares for non-investment purposes, such as maintaining control over group companies or strengthening relationships with business partners. Because of these cross-shareholding relationships, the turnover for these investor groups is relatively low and contributes to the lower overall turnover in Japan compared with in the United States.

Figure 3. Breakdown of investor types in Japan and the United States

	Japan end March 2000	U.S. end June 1999
Financial institutions	29%	10%
Non-financial companies	26%	—
Individuals	18%	40%
Pension, retirement funds	5%	25%
Investment trusts/mutual funds	2%	17%
Foreign investors	19%	7%
Other	1%	1%

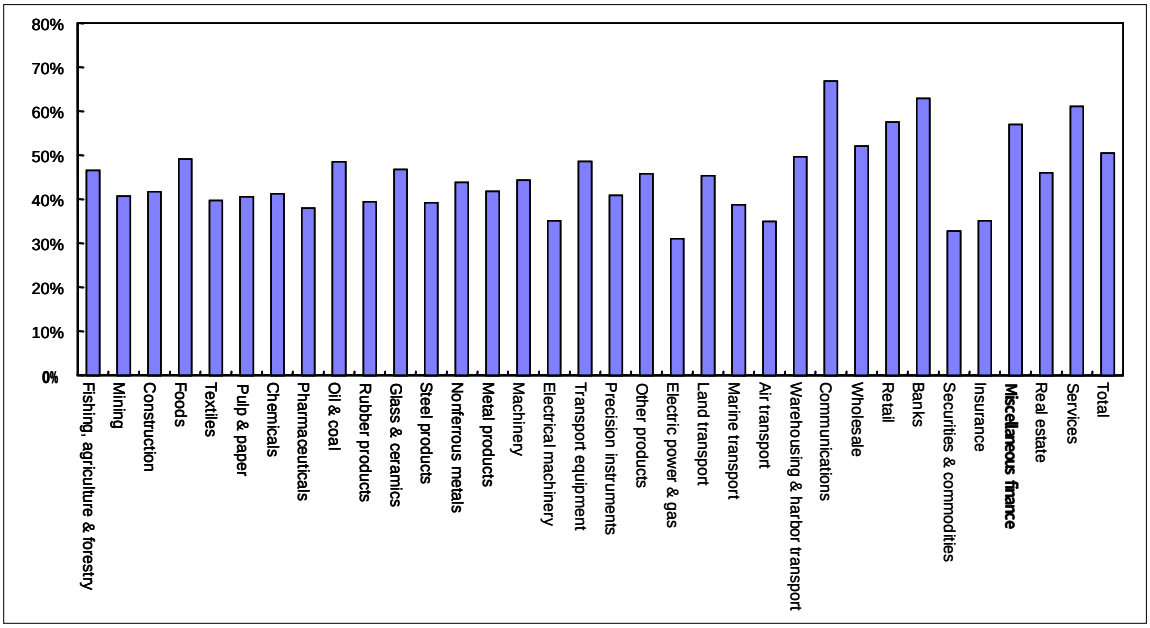
Notes: The figures for Japan do not include shares owned by public pension funds; the figures for the United States do not include shares owned by companies

Sources: Share Ownership Survey (the National Conference of Stock Exchanges), the Flow of Funds Accounts (the Federal Reserve Board)

Stable shareholdings in Japan

Cross-shareholdings—or those shares that are cross-owned for strategic purposes by non-financial companies and their main banks, or among companies in the same *keiretsu* corporate groupings—account for a large portion of the shares in Japan's stock market as well as those shares that are not held for investment purposes. These shares are held for non-investment purposes and are not frequently bought or sold on a short-term basis, and hence are referred to as stable shareholdings. Other types of stable shareholdings include government-owned shares of Nippon Telegraph and Telephone (NTT), Japan Tobacco, and other former public-sector enterprises that have been privatized; shares of publicly traded subsidiaries held by their publicly traded parent companies, such as the portion of NTT DoCoMo shares owned by NTT; and shares of Internet and other companies that are still heavily owned by the founders and other top insiders. In total, these stable shareholdings account for a significant portion of Japan's market. This proportion has been gradually declining over the past 12 years, according to Nomura estimates, but is still about half of the overall market, or 200 trillion yen.

Figure 4. Proportion of stable shareholdings by sector (fiscal 1999)



Source: Nomura

As can be seen in Figure 4, stable shareholdings are prevalent in all sectors, but are particularly high in the communications and banking sectors and relatively low in the electricity power & gas and securities & commodities sectors. The proportions of stable shareholdings for the first and second sections of the TSE are about the same as for the overall market, but for the OTC market the proportion is as high as almost 70 percent. The proportion also varies from stock to stock—it is as high as about 70 percent for NTT DoCoMo and Seven-Eleven Japan, and as low as about 20 percent for Sony and Hitachi. The overall amount of stable shareholdings in Japan is likely to decline. An increasing number of IPOs by subsidiaries and companies heavily owned by founders and other insiders could push up the overall amount of stable shareholdings in the market. But

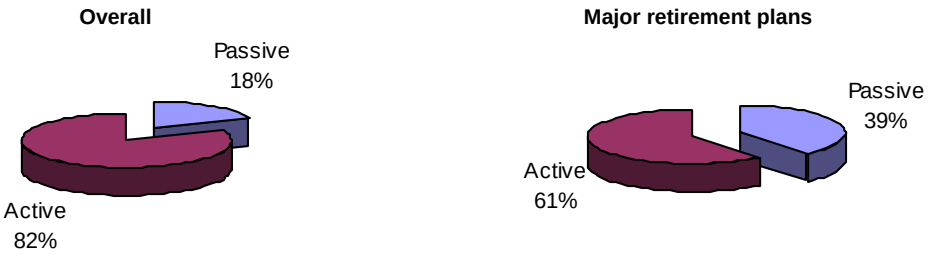
banks and non-financial companies have sold several trillion yen worth of their cross-held shares each year in the past several years—and are likely to sell an increasing amount in coming years—in part because of the introduction of mark-to-market accounting rules in September 2001 and increasing concerns among the government and the general public about banks' management of their asset risk. In addition, investment-oriented investor groups are likely to account for an increasingly large proportion of the total. Nevertheless, the amount of stable shareholdings in Japan is not likely to decline to the level in the United States anytime in the next several years.

Passive fund management in Japan

It may be somewhat surprising to many people, but one important factor when considering the relationship between the existence of stable shareholdings and distortions in the supply and demand for stocks is the extent of passive fund management. In this section, we take a close look at the passive investing approach in Japan.

In passive investing, which stands in contrast to active investing, the objective is not to generate returns in excess of the market; at the same time, the approach does not have the risks associated with active fund management. With low costs and returns in line with those of the benchmark indexes, passive investing is suited for the management of large funds. As shown in Figure 5, about 20 percent of all U.S. retirement assets invested in domestic stocks are passively managed; among large pension funds, the figure rises to about 40 percent. The extent of index investing is at a comparable level in Japan. Over the past five years, the average percentage of investment assets in trust banks' commingled accounts that are passively managed through index investing has consistently been about 30 percent. Until very recently, the proportion of real passive fund management in Japan has been low since index investing has suffered from significant tracking error and costs—so much so that it was hardly distinguishable from active investing in the United States. But over the last year or so, tracking error and costs for passive fund management have declined considerably. (Figure 6) This improvement in efficiency is likely to lead to the increased adoption of real passive investing by pension plan sponsors and others in Japan.[2]

Figure 5. Proportion of retirement assets in the U.S. that are passively managed (1999)



All funds benchmarked against the S&P 500 (representing a total of $2.4 trillion)
Source: Nomura, based on data from Nelson's Investment Managers

The top 200 defined contribution plans (average assets of about $10 billion)
Source: *Pensions & Investments*

[2] See Ohba (1999).

Figure 6. Tracking error (ω) for trust banks' commingled accounts

		1991-94		1995-99		Average
		ω (%)	No. of funds	ω (%)	No. of funds	ω (%)
Passively managed		2.14	15	1.00	18	1.57
Actively managed	Growth	6.86	3	4.96	6	5.91
	Value	5.04	16	3.16	21	4.10
	Small cap	9.41	7	8.06	8	8.73

Notes: The tracking error is the annualized standard deviation of the monthly account returns versus the returns of the benchmark index. The higher the tracking error, the higher the actively managed risk of the fund.
Source: Nomura, based on data from *Nenkin Joho* ("Pension Information")

The growth of passive fund management in the market overall has been related to the improvement in efficiency of fund management in general, and is a trend that has caught on in the investment community in Europe and the United States. But as explained later through our quantitative model, some serious problems could be developing in Japan as a result of an increasing proportion of assets that are passively managed while the proportion of stable shareholdings does not decline.

Three hypotheses regarding stable shareholdings and distortions in liquidity and supply and demand

The most widely used domestic benchmark index for Japanese investors is the TOPIX index, which by definition includes all stocks that trade on the first section of the Tokyo Stock but does not adjust for free float. In this paper, we propose three hypotheses regarding the distortions in supply and demand for stocks and the impact on volatility and liquidity that directly stem from the lack of adjustment by the TOPIX index for stable shareholdings.

- Distortions in supply and demand

When a benchmark index does not adjust for free float, the balance between the supply and demand for the stock becomes distorted. Possible direct consequences include downward pressure on stocks with supply in excess of demand, and upward pressure on stocks with demand in excess of supply.

- Volatility

The relationship between trading volume and volatility has been discussed extensively in the literature. A number of studies have reached different conclusions, but most empirical analyses have shown that volatility tends to increase as trading volumes increase (Karpoff 1987). A number of theoretical models have also been developed to back up these findings (see, for instance, Wang 1994). If there is an appropriate level of trading volume that has no impact on volatility, then a high proportion of stable shareholdings could lead to an increase in volatility since supply and demand could be distorted enough to generate trading volumes greater than the appropriate level.

- Liquidity

The stocks of larger companies typically have higher trading volumes than the stocks of smaller companies. With all else being the same, the average trading volume for a stock is generally proportional to the number of shares that trade freely in the market. Hence, if

the proportion of stable shareholdings for a stock is high, then the turnover for the stock should be lower than otherwise.

The next section develops a model for calculating the distortions in supply and demand for stocks and testing the first hypothesis. The final section empirically tests all three hypotheses using market data for the last 20 years.

A model for calculating distortions in supply and demand for stocks

When the investable portion of a stock's outstanding shares differs from the number of shares that are included in the calculation of a benchmark index, the balance between the supply and demand for the stock becomes distorted. Possible direct consequences include downward pressure on stocks with supply in excess of demand, and upward pressure on stocks with demand in excess of supply. Since the TOPIX index does not adjust for stable shareholdings, those stocks with a large proportion of cross-shareholdings—and hence a free float that is smaller than the total number of outstanding shares—have a disproportionately large weighting in the TOPIX index. One possible result is that demand for such stocks from active fund managers whose performance is benchmarked against the index is greater than the available supply of shares in the market, thereby distorting the price of the stocks. Similar price distortions could affect those stocks with a small proportion of cross-shareholdings and thus a proportion of stable shareholdings that is lower than the market average; these stocks have a supply of shares that is greater than the demand. These distortions would similarly affect stocks with high proportions of stable shareholdings for reasons other than cross-shareholdings.

This section develops a formula for calculating the difference between the portfolio of average active managers and the overall market portfolio, based on the proportion of passively managed assets in the market and the proportions of stable shareholdings for stocks. The following assumptions were necessary to develop the formula:

- The overall market = investable universe (of shares) + shares with stable ownership
- Each stock has the same market value weighting in the benchmark index as well as the overall market basket
- The investable universe is not the same as the benchmark index
- The investable universe = the portion that is actively managed + the portion that is passively managed
- Stable shareholdings are not traded, and the portion of the market that is passively managed mirrors the benchmark index in terms of weightings

Given these assumptions, the market weightings of the remaining stocks, i.e. those that are actively managed, are not the same as the weightings of stocks in the benchmark index. Prior to deriving a formula for calculating this divergence in weightings, let us define several variables, as follows:

- The vector of the market values of the stocks $V_M = (v_1, v_2, v_3 ... v_n)$
- The vector of the market values of the stable shareholdings V_N
- The vector of the total amount of stocks invested passively V_P
- The vector of the total amount of stocks invested actively V_A
- The vector of size; |x| = vector x the sum of the factors

- The vector of weightings; $w_* = \frac{V_*}{|V_*|}$

Also,
Total market value of all stocks = the market value of the stocks that are actively managed + the market value of the stocks that are passively managed + the market value of stable shareholdings

From the above, the following equality can be established:

$$V_M = V_P + V_A + V_N \tag{1}$$

Given the assumption that each stock has the same market value weighting in the benchmark index as well as the overall market basket, the following can be expressed:

$$V_P = R_P V_M \tag{2}$$

(However, $R_P = \frac{|V_p|}{|V_M|}$)

Thus, from equations 1 and 2,

$$V_A = (1 - R_P)V_M - V_N \tag{3}$$

Based on the above, the divergence of the average weightings of stocks that are actively managed from the benchmark index weightings can be calculated in the following manner:

$$w_A - w_M = \frac{V_A}{|V_A|} - \frac{V_M}{|V_M|} = \frac{(1-R_P)V_M - V_N}{|V_A|} - \frac{V_M}{|V_M|} = K(w_M - w_N) \tag{4}$$

However, $K = K(R_N, R_P) \equiv \frac{R_N}{1 - R_N - R_P}$

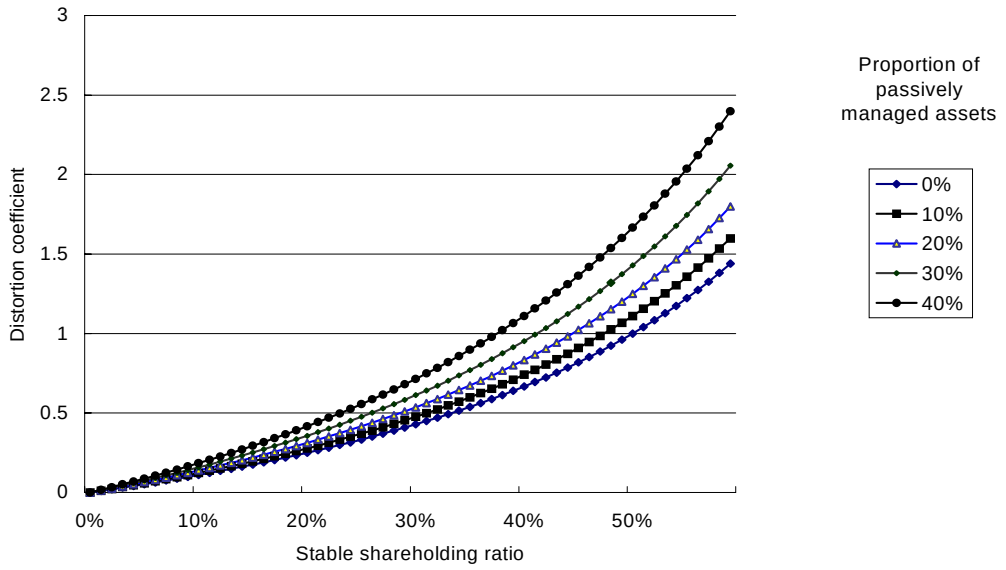
where R_N is the proportion of stable shareholdings in the market (the amount of stable shareholdings relative to the total market) and R_P is the proportion of stocks that are passively managed (the amount of passively managed assets relative to the total market).

Thus, the difference between the portfolio of average active managers and the overall market portfolio is proportional to $w_M - w_N$.

Note that the formula can be easily expanded to include not only the assumption that the benchmark index does not adjust for stable shareholdings, but also the assumption that it does not include a segment of the market. In this case, a distortion in supply and demand develops between the segment that is not included in the benchmark index and the segment that is. The larger the market value of the segment that is not included in the benchmark index, the less these problems can be ignored.

In equation 4, the extent of the distortion in weightings for an individual stock $w_A - w_M$ is equal to the market weighting minus the stable-shareholding portfolio weighting, times a market-distortion coefficient K. This distortion coefficient is a multiple that amplifies the distortion for an individual stock, and is an increasing function relative to both the proportion of stocks that are actively managed and the proportion of stable shareholdings. (Figures 7 and 8)

Figure 7. Relationship between the proportion of stable shareholdings and the distortion coefficient



Source: Nomura

Figure 8. The distortion coefficient for different combinations of proportions of stable shareholdings and proportions of passively managed assets

Ratio of stable shareholdings \ Ratio of passively managed assets	0%	10%	20%	30%	40%	50%	60%
0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10%	0.11	0.12	0.14	0.16	0.19	0.22	0.28
20%	0.25	0.28	0.31	0.36	0.42	0.50	0.63
30%	0.43	0.48	0.54	0.61	0.71	0.86	1.07
40%	0.67	0.74	0.83	0.95	1.11	1.33	1.67
50%	1.00	1.11	1.25	1.43	1.67	2.00	2.50
60%	1.50	1.67	1.88	2.14	2.50	3.00	3.75

Source: Nomura

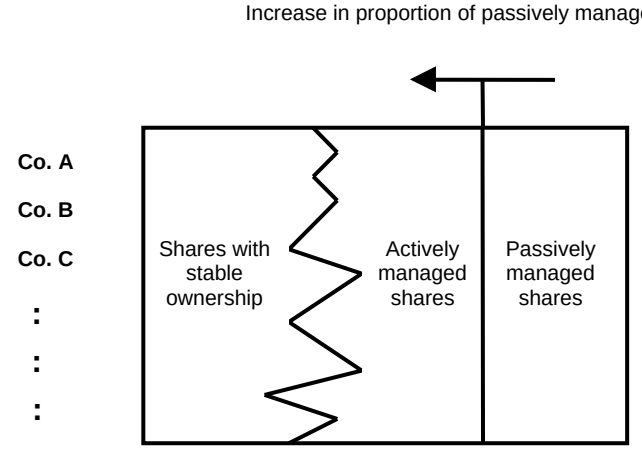
For instance, if the proportion of stable shareholdings is zero, the distortion is also zero, regardless of the proportion of passively managed assets. In contrast, for high proportions of stable shareholdings, the distorting impact of the divergence in weightings is proportional to the proportion of passively managed assets. Also, the distortion

coefficient is not zero even if the proportion of passively managed assets is zero, except in the case when the proportion of stable shareholdings is zero.

Based on equation 4, active fund managers must allocate their assets to these stocks with divergent weightings, regardless of the managers' expected returns for the stocks. Those stocks with positive divergences are overweighted on average, and those with negative divergences are underweighted on average. If the overweighted stocks rise, the manager's investment performance improves, regardless of the manager's actual skill. Conversely, if the stocks fall, performance is hurt. If active managers make moves to minimize these divergences in weightings and thus distortions in performance, demand exceeds supply for some stocks, and supply exceeds demand for other stocks.

Figure 9. Diagram of the distortion

In the diagram below, the stocks of all companies are listed vertically, and their shares are classified as stable shareholdings, actively managed shares, or passively managed shares. The proportion of passively managed shares is the ratio of passively managed shares to total shares, and the proportion of stable shareholdings is the ratio of stable shareholdings to total shares. The actively managed shares constitute the remaining portion in the center of the diagram. The stable shareholdings lead to distortions from the average weightings, and thereby affect the actively managed shares. And as the proportion of passively managed shares increases, the impact of the distortions increases.



Source: Nomura

In the same way that the flow of water from a hose intensifies if one partially covers the opening of the hose, excess demand from investors develops for those stocks that are constantly in short supply and leads to price distortions. In other words, stocks that active fund managers consistently underweight relative to the index because the index does not adjust for stable shareholdings are in short supply relative to demand and hence rise in price, while those stocks with a supply greater than demand decline in price. In this way, prices become distorted to the upside as well as downside for those stocks with significant divergences in weightings. This phenomenon has been explained using an expanded version of the conventional Capital Asset Pricing Model.[4]

[4] See Kobayashi and Yamada (2000).

The weighting divergence for stocks with large market capitalizations can easily widen in absolute terms. The divergence is large and negative for those stocks with high proportions of stable shareholdings, and is large and positive for those stocks with low proportions of stable shareholdings. The extent of the distortion is not at all minimal, even if various realistic values are substituted into the calculation. For instance, NTT DoCoMo has a TOPIX weighting of 8.5 percent but accounts for 12.7 percent of all stable shareholdings. Based on a value of 0.8 for K for the Japanese market today, the divergence can be calculated as follows:

Divergence = 0.8 x (8.5% – 12.7%) = 3.2 percentage points

In other words, the average active fund manager is underweight NTT DoCoMo by 3.2 percentage points relative to the TOPIX. This underweighting increases to 5.0 percentage points if the distortion coefficient K rises to 1.2 because of an increase in the proportion of passively managed assets.

Figure 10 lists the 10 stocks with the greatest underweightings as of the end of January 2000. NTT DoCoMo tops the list, followed by Seven-Eleven Japan and Hikari Tsushin. In contrast, the top stocks in terms of overweightings are NTT and Sony, as shown in Figure 11.

Figure 10. Top stocks underweighted by active fund managers

	Stock	Divergence (percentage point) (when K=0.8)	Divergence (percentage point) (when K=1.2)
1	NTT DoCoMo	-3.34	-5.00
2	Seven-Eleven Japan	-1.11	-1.67
3	Hikari Tsushin	-0.88	-1.32
4	Bank of Tokyo-Mitsubishi	-0.60	-0.90
5	Softbank	-0.50	-0.74
6	NTT Data	-0.47	-0.71
7	Sumitomo Bank	-0.46	-0.70
8	Fuji Bank	-0.44	-0.66
9	Matsushita Communication Industrial	-0.38	-0.56
10	Sanwa Bank	-0.34	-0.50

Source: Nomura

Figure 11. Top stocks overweighted by active fund managers

	Stock	Divergence (percentage point) (when K=0.8)	Divergence (percentage point) (when K=1.2)
1	NTT	1.37	2.05
2	Sony	1.26	1.88
3	Hitachi	0.52	0.78
4	Murata Mfg.	0.43	0.65
5	Matsushita Electric Industrial	0.42	0.64
6	Rohm	0.42	0.62
7	Kyocera	0.41	0.61
8	Fujitsu	0.30	0.44
9	Tokyo Electric Power	0.28	0.42
10	Canon	0.27	0.40

Source: Nomura

The shortage in the supply of shares of NTT DoCoMo stemming from the divergences in the weightings is particularly high. A divergence of 3-5 percentage points means that an investor in a Japan stock portfolio could have a return that is 3-5 percentage points different from that of the overall market if the particular stock moves in a direction completely opposite to that of the rest of the market. Also, given that these types of stocks tend to have peculiar price moves, such divergences in weightings are at levels that are unacceptable for both fund managers and those who assess fund managers'

performance, for reasons discussed later. One way to minimize these problems is to come up with a better benchmark index—an issue that is discussed later.

One intriguing case concerns the market values of NTT and subsidiary NTT DoCoMo. As of the end of October 2000, NTT had a market value of about 16 trillion yen and NTT DoCoMo about 28 trillion yen. What is odd about this situation is that NTT, the parent company, owns roughly two-thirds of the shares of NTT DoCoMo, with a market value of about 20 trillion yen, which is more than the entire market value of NTT itself. In essence, then, the market is valuing NTT—which is a company with actual business operations, nonetheless—at less than the value of the shares it owns of a subsidiary. NTT, of course, has liabilities and other assets, but this anomaly is still intriguing and difficult to explain. One reason could be the distortions in the supply and demand for shares of both NTT and NTT DoCoMo.

An empirical test of the three hypotheses

The existence of stable shareholdings and the trend toward eliminating them could have a broad impact on stock returns, liquidity, and volatility. This section looks at the impact of the proportion of stable shareholdings and the resulting supply-demand distortions on Japan's stock market, based on stock data for the last 20 years. The data were analyzed using regressions of the following factors over four five-year periods:

1. Stock returns: Annualized five-year returns (percent)
2. Volatility: $\sqrt{12}$ times the 60-month standard deviation (annualized, percent)
3. Turnover: Monthly turnover = 12 x the 60-month average of the trading value divided by number of listed shares (annualized, percent)
4. Size: 60-month average of the monthly market value of the stock, and the log of the market value
5. Proportion of stable shareholdings: A five-year average, with the values as of the end of March regarded as the values for each year
6. Distortion: TOPIX index weighting – proportion of stable shareholdings[5]

Figure 12. Correlation coefficients for various factors over the entire period

Entire period	Return (%)	Volatility (%)	Turnover (%)	Size	Proportion of stable shareholding (%)	Distortion (%)
Return (%)	1.00	0.18	0.33	0.11	0.00	-0.02
Volatility (%)	0.18	1.00	0.28	-0.18	0.12	0.02
Turnover (%)	0.33	0.28	1.00	0.16	-0.23	-0.04
Size	0.11	-0.18	0.16	1.00	-0.25	-0.03
Proportion of stable shareholding (%)	0.00	0.12	-0.23	-0.25	1.00	0.15
Distortion (%)	-0.02	0.02	-0.04	-0.03	0.15	1.00

Source: Nomura

A matrix of correlation coefficients for the data is shown in Figure 12. Particularly large correlation coefficients are the positive one for turnover and volatility and the negative one for the proportion of stable shareholdings and turnover, both of which can be

[5] The basis for calculating the distortion this way is provided by equation 4 in the previous section.

explained by the hypotheses behind the analysis in this paper. Other large coefficients are the positive one for turnover and return and the negative one for the proportion of stable shareholdings and size, both of which could be related to the characteristics of Japan's stock market. In analyzing whether volatility and turnover can be explained by the proportion of stable shareholdings, it becomes evident that factors that introduce bias into the analysis, such as the tendency of small companies to have high proportions of stable shareholdings, need to be excluded. To test for the statistical significance of these relationships and to see whether there were differences in the relationships in different periods, we used a multivariate regression analysis.

- Return (the left section of the tables in Figure 14)

In line with our hypothesis, the results of our regression analysis for return and other variables show that a distortion of 1 percentage point leads to a decline in return of 6 percentage points. Over the entire period, the relationship strengthened; the correlation coefficient was positive in the first period, and then turned negative and became quite large by the fourth period. Part of the explanation for this trend is perhaps that a market cap-weighted index such as the TOPIX was not originally regarded as a benchmark index, and hence there were few stocks with major divergences in weightings. The general trends for the other variables over the last 20 years indicate that returns were higher for high volatility, high turnover, large size, and a high proportion of stable shareholdings.

- Volatility (the middle section of the tables in Figure 14)

In line with our hypothesis, the results of our regression analysis for volatility and other variables show that the higher the proportion of stable shareholdings, the higher the volatility (if the impact of size is excluded). This relationship was strong in the first and last periods, and weak in the second and third periods. Other factors had weak explanatory power during the economic bubble years; volatility during this time was most likely determined by factors other than liquidity and size. The regression results show that volatility increases by 20 basis points for every 1 percentage point change in the proportion of stable shareholdings.

Figure 13. Multivariate regression results (20-year span)

Return as dependent variable				Volatility as dependent variable				Turnover as dependent variable			
Independent variable	Regression coefficient	t-statistic	p-value	Dependent variable	Regression coefficient	t-statistic	p-value	Dependent variable	Regression coefficient	t-statistic	p-value
Intercept	-41.82	-13.99	0.00	Intercept	38.88	33.95	0.00	Intercept	26.98	11.19	0.00
Volatility	0.24	9.29	0.00	Return	0.04	9.29	0.00	Return	0.23	28.19	0.00
Turnover	0.35	28.19	0.00	Turnover	0.15	30.51	0.00	Volatility	0.60	30.51	0.00
Size	2.92	9.50	0.00	Size	-2.50	-20.62	0.00	Size	3.21	13.06	0.00
Stable shareholding ratio	0.27	7.92	0.00	Stable shareholding ratio	0.18	13.63	0.00	Stable shareholding ratio	-0.64	-24.20	0.00
Distortion	-6.07	-1.98	0.05	Distortion	0.54	0.44	0.66	Distortion	-0.91	-0.37	0.71

Source: Nomura

- Turnover (the right section of the tables in Figure 14)

The results of our regression analysis for turnover and other variables show that for every period, an increase in the proportion of stable shareholdings of 1 percentage point leads to

Figure 14. Multivariate regression results (5-year periods)

First period: Oct. 1979 – Sep.1984 (post-high-growth period)

Return as dependent variable				Volatility as dependent variable				Turnover as dependent variable			
Independent variable	Regression coefficient	t-statistic	p-value	Independent variable	Regression coefficient	t-statistic	p-value	Independent variable	Regression coefficient	t-statistic	p-value
Intercept	-51.17	-9.75	0.00	Intercept	29.42	18.03	0.00	Intercept	-17.27	-2.80	0.01
Volatility	0.94	12.92	0.00	Return	0.10	12.92	0.00	Return	0.05	1.66	0.10
Turnover	0.04	1.66	0.10	Turnover	0.16	25.27	0.00	Volatility	1.86	25.27	0.00
Size	6.38	10.59	0.00	Size	-2.94	-15.22	0.00	Size	7.83	11.43	0.00
Stable shareholding ratio	0.07	1.04	0.30	Stable shareholding ratio	0.17	7.89	0.00	Stable shareholding ratio	-0.76	-10.24	0.00
Distortion	17.25	1.45	0.15	Distortion	1.13	0.29	0.77	Distortion	-1.66	-0.12	0.90

Second period: Oct. 1984 – Sep.1989 (economic bubble years)

Return as dependent variable				Volatility as dependent variable				Turnover as dependent variable			
Independent variable	Regression coefficient	t-statistic	p-value	Independent variable	Regression coefficient	t-statistic	p-value	Independent variable	Regression coefficient	t-statistic	p-value
Intercept	-29.43	-3.64	0.00	Intercept	37.74	18.91	0.00	Intercept	36.73	5.39	0.00
Volatility	1.41	18.09	0.00	Return	0.10	18.09	0.00	Return	0.12	6.56	0.00
Turnover	0.17	6.56	0.00	Turnover	0.06	8.76	0.00	Volatility	0.61	8.76	0.00
Size	3.72	4.69	0.00	Size	-1.81	-8.62	0.00	Size	5.39	8.11	0.00
Stable shareholding ratio	-0.05	-0.62	0.53	Stable shareholding ratio	0.06	2.40	0.02	Stable shareholding ratio	-0.81	-11.44	0.00
Distortion	-2.66	-0.65	0.52	Distortion	0.02	0.02	0.99	Distortion	-3.73	-1.07	0.28

Third period: Oct. 1989 – Sep.1994 (post-bubble years, first half)

Return as dependent variable				Volatility as dependent variable				Turnover as dependent variable			
Independent variable	Regression coefficient	t-statistic	p-value	Independent variable	Regression coefficient	t-statistic	p-value	Independent variable	Regression coefficient	t-statistic	p-value
Intercept	-21.15	-14.16	0.00	Intercept	52.60	24.92	0.00	Intercept	19.73	4.76	0.00
Volatility	0.26	21.19	0.00	Return	0.59	21.19	0.00	Return	0.13	2.47	0.01
Turnover	0.02	2.47	0.01	Turnover	0.13	11.96	0.00	Volatility	0.41	11.96	0.00
Size	0.15	1.04	0.30	Size	-2.40	-10.97	0.00	Size	3.10	7.95	0.00
Stable shareholding ratio	0.06	3.76	0.00	Stable shareholding ratio	0.07	2.85	0.00	Stable shareholding ratio	-0.45	-10.99	0.00
Distortion	-2.95	-1.19	0.24	Distortion	5.62	1.49	0.14	Distortion	-2.54	-0.38	0.70

Fourth period: Oct. 1994 – Sep.1999 (post-bubble years, first half)

Return as dependent variable				Volatility as dependent variable				Turnover as dependent variable			
Independent variable	Regression coefficient	t-statistic	p-value	Independent variable	Regression coefficient	t-statistic	p-value	Independent variable	Regression coefficient	t-statistic	p-value
Intercept	-85.33	-17.97	0.00	Intercept	47.36	23.35	0.00	Intercept	2.42	0.72	0.47
Volatility	0.46	11.84	0.00	Return	0.09	11.84	0.00	Return	0.05	4.05	0.00
Turnover	0.11	4.05	0.00	Turnover	0.34	34.99	0.00	Volatility	0.80	34.99	0.00
Size	5.84	11.71	0.00	Size	-4.03	-18.98	0.00	Size	3.25	9.61	0.00
Stable shareholding ratio	0.51	9.86	0.00	Stable shareholding ratio	0.17	7.52	0.00	Stable shareholding ratio	-0.48	-13.89	0.00
Distortion	-39.08	-4.61	0.00	Distortion	4.19	1.12	0.26	Distortion	3.21	0.56	0.58

Source: Nomura

a decline in turnover of 50-80 basis points. These results back up our hypothesis and indicate that the average number of shares traded of a stock has more to do with the size of the free float rather than the total number of shares outstanding. This relationship was consistent across all periods.

In the above ways, past data show that stable shareholdings affect liquidity and volatility. If these relationships continue to hold, the unwinding of cross-shareholdings should contribute to reduced volatility and increased turnover in Japan's market. The data also indicate that the relationship between excess returns and distortions in supply and demand for stocks used to be weak but has become stronger recently. If this relationship continues to hold, an increase in distortions should lead to an increased impact on returns of individual stocks.

Future trends in stable shareholdings

The different proportions of stable shareholdings among stocks have affected stock returns, volatility, and liquidity in a variety of ways. Given the recent management challenges that Japanese companies have been facing, cross-shareholdings are one type of stable shareholding that are on the decline. Banks' and non-financial companies' sales of cross-shareholdings should contribute to an overall decline in stable shareholdings, and based on one of the hypotheses in this paper, should alleviate the shortage of shares of those stocks with high proportions of cross-shareholdings, increase liquidity, and reduce volatility.

However, as Japan's stock market grows, one factor that could contribute to an increase in the proportion of stable shareholdings is the likelihood of an increase in initial public offerings of subsidiaries that are substantially owned by their publicly traded parent companies and companies that are heavily owned by their founders and other key insiders. And given the increasing shift by major public pension funds toward passive investing, the distortions in the supply and demand for stocks created by a benchmark index that does not adjust for free float are an issue that Japanese investors can no longer afford to ignore.

An appropriate benchmark index for Japanese stocks

Characteristics of an effective benchmark index

Based on the points made in this paper, the following can be considered essential characteristics of an effective benchmark index:

1. Adjustment for free float. The benchmark index should be calculated based only on the shares that are freely available for purchase and sale in the market, by adjusting for free float or excluding those stocks with very low free floats.
2. Use of composite prices. If the same stock has multiple prices because it trades on several exchanges, the benchmark index should use the price of the stock on the exchange with the greatest liquidity.
3. Broad market coverage
4. Exclusion of stocks with extremely low liquidity

The last two factors involve a trade-off—that is, a focus on market coverage at the expense of including illiquid stocks results in a total market index, while a focus on excluding very illiquid stocks results in a core, or large-cap, index. Figure 15 lists the benchmark indexes most widely used by institutional investors in the United States, based on data from Nelson's Investment Managers, an information source used by many U.S. pension fund managers and other investors.

As shown in the table, U.S. investors mainly use the S&P 500 index (for large-cap investing), the Russell 2000 (for small-cap investing), and the MSCI-EAFE index (for foreign investing). For value and growth investing, the most widely used indexes are those of Frank Russell Co., followed by those of S&P/Barra. Among the Japan indexes, the TOPIX index ranks 20th in the whole group, but the most well-known Japan index for U.S. investors is probably the MSCI Japan index, since it is a sub-index of the widely used MSCI-EAFE index and MSCI World index.

Figure 15. Stock and property indexes most widely used as benchmarks by U.S. institutional investors

	Index	Style/asset class	Assets benchmarked against the index ($ mil)	No. of funds	Average assets per fund ($ mil)
1	S&P 500	large cap	2,440,180	1,184	2,061
2	MSCI EAFE	foreign	503,801	205	2,458
3	Russell 2000	small cap	175,065	304	576
4	MSCI World	global	143,393	79	1,815
5	MSCI EAFE Free	foreign	107,246	9	11,916
6	Russell 1000 Growth	growth	104,600	55	1,902
7	Russell 1000 Value	value	84,891	69	1,230
8	S&P Mid-Cap 400	mid cap	73,058	87	840
9	Russell 2000 Growth	small-cap growth	59,743	86	695
10	S&P/BARRA Value	value	54,118	35	1,546
11	MSCI Emerging Markets Free	emerging markets	48,133	33	1,459
12	Russell 1000	large cap	46,673	24	1,945
13	Russell-NCREIF Property	real estate	42,072	32	1,315
14	Wilshire 5000	total market	39,501	13	3,039
15	MSCI Europe 14	European	37,133	28	1,326
16	Russell 2500	small/mid cap	28,115	39	721
17	Russell Midcap	mid cap	25,485	37	689
18	Russell Midcap Growth	mid-cap growth	25,070	32	783
19	S&P/BARRA Growth	growth	24,883	19	1,310
20	TOPIX	Japanese	23,766	10	2,377

Note: Figures are as of the end of September 1999
Source: Nomura, based on data from Nelson's Investment Managers

In addition to MSCI's international indexes, against which several hundred trillion yen in equity assets are benchmarked, there are a number of international indexes created and managed by FTSE, a joint venture between the Financial Times and the London Stock Exchange (although these FTSE indexes are most widely used in Europe, particularly the United Kingdom).

Comparison of several Japanese and U.S. benchmark indexes

Figure 16 provides a comparison of several of the leading benchmark indexes for Japanese and U.S. stocks. Both the RUSSELL/NOMURA and FTSE-Japan indexes are calculated using the number of investable shares, but stable shareholdings are calculated differently. In contrast, the MSCI Japan index factors in investable shares mainly through

the process of selecting constituent stocks, by excluding a subsidiary if the parent company is already included, for example. On this basis, the index includes NTT and Ito-Yokado, but excludes their respective subsidiaries, NTT DoCoMo and Seven-Eleven Japan. Although MSCI's methodology is easy to understand and implement, its indexes tend to have low market coverage in terms of market capitalization; the MSCI Japan index has a market coverage of only 60 percent. MSCI has announced it will adjust for free float in a two-phase process ending in May 2002. The changes will lead to an estimated turnover in the MSCI Japan index of as high as 37 percent. Another important aspect regarding index methodology is whether an index is a composite one that covers the stocks on all exchanges within a national market. In the case of Japan, the limitations of indexes that cover only designated market segments, such as the Tokyo Stock Exchange or the OTC market, will become apparent if investors increase their trading in other markets.

Figure 16. Comparison of leading benchmark indexes for Japanese and U.S. stocks

	Index	Provider	No. of stocks	Market cap coverage	Universe	Adjustment for stable shareholdings
Japanese stocks	TOPIX	Tokyo Stock Exchange	~1,300	90%	TSE first-section stocks only	None
	MSCI Japan (part of MSCI World)	MSCI	~300	60%	All stocks in Japan	Mainly through selection of stocks
	FTSE -Japan (part of MSCI World)	FTSE	~300	90%	All stocks in Japan	Through weightings
	RUSSELL/NOMURA Total Market	Frank Russell Co. and Nomura	~1,900	98%	All stocks in Japan	Through weightings
	RUSSELL/NOMURA Large Cap	Frank Russell Co. and Nomura	500	85%	All stocks in Japan	Through weightings
U.S. stocks	S&P 500	**S & P**	500	70%	All stocks in the U.S.	Through selection of stocks
	Russell 3000	Frank Russell Co.	3000	98%	All stocks in the U.S.	Through weightings

Notes: Data are as of the end of June 2001; market cap coverage is an assumed benchmark figure based on figures announced by the index companies, which they calculate differently
Source: Nomura, based on various information sources

Of the various Japan stock indexes, the one that is most widely used by pension funds and other Japanese institutional investors is the TOPIX, while the one that is most widely used by U.S. and other foreign investors is the MSCI Japan index. Both indexes have flaws, and treat such leading Japanese stocks as NTT and NTT DoCoMo in completely different ways. (Figure 17)

In the future, benchmark indexes are likely to be gradually revised to reflect the characteristics of an effective benchmark mentioned earlier.

Figure 17. Inclusion factors for NTT and NTT DoCoMo in various indexes

	TOPIX	**MSCI Japan**	**FTSE-Japan**	**RUSSELL/NOMURA**
NTT	47%	80%	20%	34%
NTT DoCoMo	100%	0%	46%	31%

Notes: Figures are as of the end of October 2000; the TOPIX includes 100 percent of the shares of stocks on the first section of the TSE, as a rule, but includes only 47 percent of NTT's shares because the government's 53 percent stake in the company is not considered to be freely traded
Source: Nomura

Conclusion

This paper discussed the impact of cross-shareholdings and other types of stable shareholdings on investment management in Japan, including the relationship with the way benchmark indexes are calculated. The combination of a diverse range of proportions of stable shareholdings among stocks and the widespread use of a benchmark index that does not adjust for free float leads to distortions in the supply and demand for stocks and a variety of other problems. Furthermore, all else being the same, the increasing shift to a passive investment approach by public pension funds and other institutional investors in Japan is likely to exacerbate these distortions.

The simplest way to minimize these distortions would be for evaluators of investment performance, such as pension plan sponsors and other sources of investment assets, to take the initiative and designate a benchmark index that adjusts for stable shareholdings. Of course, transitioning to such an index from the TOPIX would involve time and other costs, but not doing so would mean that the existing inefficiencies in investment management in Japan today would continue and perhaps worsen.

Appendix. An outline of a method for calculating proportions of stable shareholdings[6]

Stable shareholdings—including subsidiary shares owned by the parent company, company shares owned by the founders and other top insiders, and cross-shareholdings—are estimated using data from the following two types of sources:
1) Major shareholder data published by Toyo Keizai
2) Shareholder data disclosed in annual securities filings
Major shareholder data cover fiscal years ending through June, while data from disclosures in securities filings are for the latest fiscal year ended. If there is an overlap, priority is given to the major shareholder data.

However, excluded from stable shareholdings are those shares in pension and investment trust assets managed by domestic life insurance companies and trust banks, shares owned by foreign banks and venture capital firms, and other shares that are believed to be owned for investment purposes. Marketable securities listed in securities filings as current assets are included as stable shareholdings.

[6] For details, see "RUSSELL/NOMURA Japan Equity Indexes: Index construction rule book."

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[7] Please provide a more proper name for this conference.