Japanese share prices

Shuichi Uemura and Takeshi Kimura

Preface

The bubble of the late eighties burst in the early nineties, plunging Japanese share prices into a prolonged slump that is in stark contrast to the rising share prices seen in other industrialised countries (Figure 1). This paper verifies, in light of conditions in the Japanese stock market, the role played by the information value of share prices, describes the distinguishing features of share price formation in Japan and makes some observations about the most recent share price slump. Below, the major points are summarised.

1) We begin by using Granger causality tests and time series correlations to verify the relationship between share prices and major economic indicators, finding that share prices lead several real economic indicators, including real GDP. We also use an econometric technique, called the Probit method, to verify the potential for share prices to forecast an economic recession, finding a certain degree of usefulness.

2) We next examine Japanese share price formation in the past, noting that a moving average of the rate of share price change evinces almost exactly the same trends as the rate of land price change. This indicates that there is a close relationship between share prices and land prices. Share price levels (market capitalisation) have been consistent with corporate net asset values when calculated in terms of reacquisition costs, and this trend held true even during the bubble period of the late eighties. Rising land prices made a considerable contribution to the increase in corporate net asset values during the late eighties, and it is likely that the unrealised profits on land, which contained a bubble, were translated directly into share price formation. This is consistent with the phenomenon seen in the nineties, when share prices have been slumping as land prices dropped.

3) Additionally, we use the "dividend discount model", one of the leading models for asset price determination, as a framework to consider the factors behind the recent share price slump. In the nineties, the difference between long-term interest rates and the earnings yield[1] – in other words, the yield spread – has continued to decline. This is basically a reflection of the decline in the expected growth rate of nominal earnings, but the expansion in the risk premium has also played a part. We regressed risk premium changes with several explanatory variables and found that the movements in the risk premium during the nineties can, for the most part, be explained by an expansion in credit risk. What is more, it is likely that falling land prices are behind this expansion in credit risk. Note that in recent years there has been a contrasting development in share prices between sectors that are respectively less and more vulnerable to land price drops.

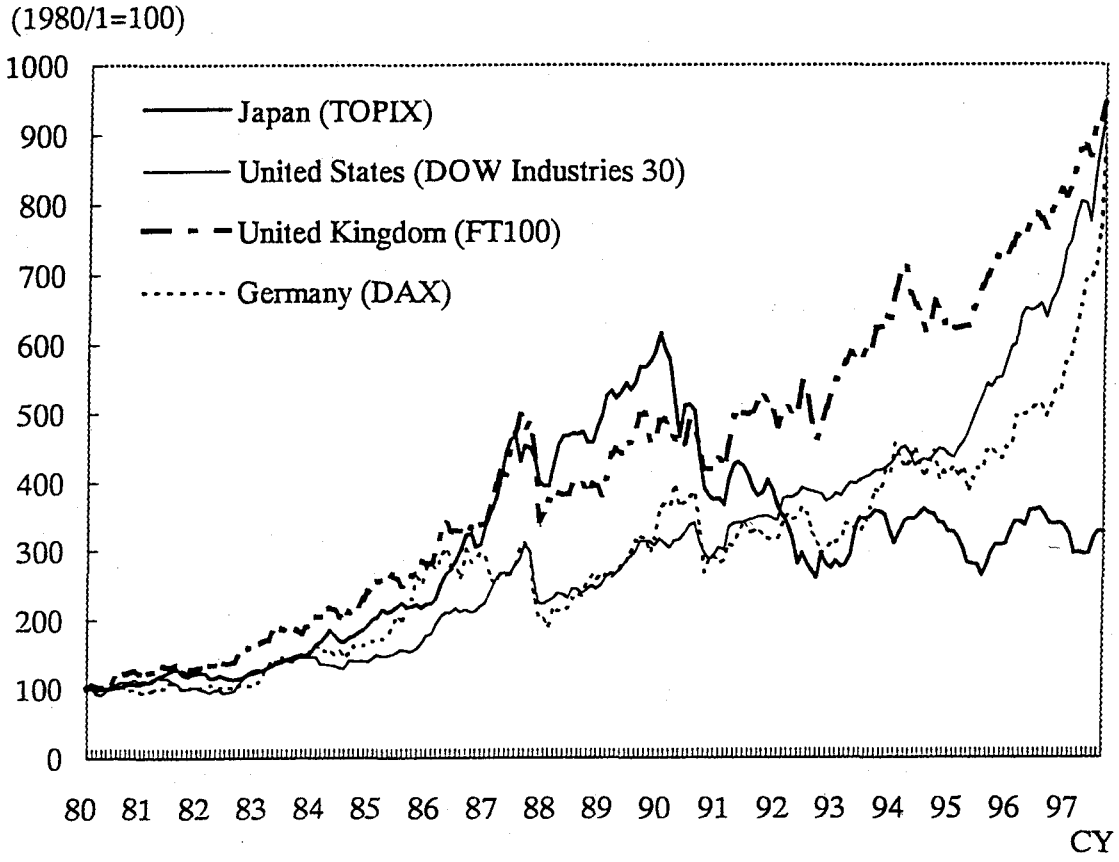
4) It appears that the basic factors behind the slump in Japanese share prices are lower expected nominal growth rates and higher credit risks. Fundamentally, therefore, they are the after-effects of the land bubble. During this period we have also witnessed signs of structural changes in the stock market in the form of a less significant role being played by personal investors, a greater role of foreign investors, an unwinding of share crossholding relationships, and new emphasis on return on equity as an investment yardstick. It is not clear what influence these developments have had on share prices nor is the pace of change expected to accelerate in

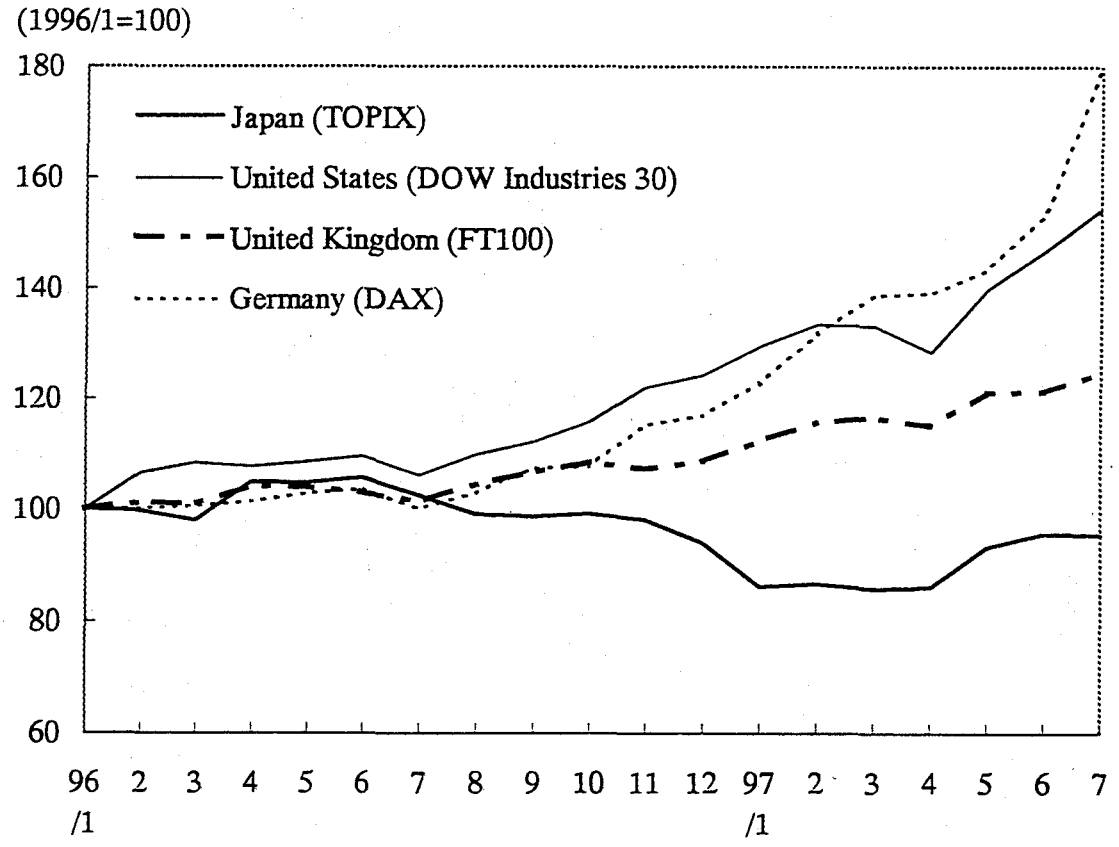
---

[1] The inverse of the price/earnings ratio; note that this paper uses a price/earnings ratio adjusted for cyclical factors and share crossholding relationships.

Figure 1

Share prices in industrialised countries





the future. However, policy makers who are looking at share prices will need to be aware of the influence that structural changes in the market may have on share price formation.

5) During the past year, share price movements have been unstable. The chief causes of this have been greater uncertainty about the economic future caused by fiscal consolidation and an expansion in credit risks as triggered by the after-effects of the bubble in the form of several corporate bankruptcies. The low yield spread would indicate that there is little room to consider Japanese shares as over-valued at current levels, but that does not mean the uncertainties over share prices will be resolved any time soon. This paper concludes that for Japanese share prices to recover in the future, four things will be required: recovery of the expected macroeconomic growth rate; relief from the high credit risks brought by falling land prices; more emphasis on shareholder values, such as the revision of dividend policies and improvement of return on equity (for example, by buying back shares from the market); and enhancements to market infrastructure, for example, better accounting and disclosure standards.

1. Share prices as an information variable

In this section, we use a number of statistical techniques to verify whether share price movements in Japan contain information regarding future economic conditions to a significant degree.

Granger test

We began by testing for Granger causality[2] using a two-variable VAR for the period from the first quarter 1970 to the second quarter 1997. Share prices and economic indicators served as the variables (all measured as logarithmic four-term differences). We were unable to confirm a significant leading relationship for general price levels except for the CPI.[3] In testing for relationships with the

Results of Granger tests between share price and other variables

	Share prices --> Other variables	Other variables --> Share prices
CPI	* F value = 4.463	+ F value = 1.001
WPI	+ F value = 2.152	+ F value = 0.522
GDP deflator	+ F value = 2.442	+ F value = 0.461
Real GDP	** F value = 2.678	+ F value = 0.912
Real domestic private demand	* F value = 4.218	+ F value = 0.671
Real private-sector consumptive expenditures	** F value = 3.119	+ F value = 1.317
Real private-sector capital investment	* F value = 3.786	+ F value = 0.176

Note: * indicates significance at the level of 1%; ** indicates significance to the level of 5% and + no significance.

2 The Granger test was performed using a four-term lag model. The reason for selecting four terms (or, one year) was that our purpose was to verify the usefulness of share prices as an information variable for policy administration. Too long of a lead, even if it could be detected, would be of limited practical use. Obviously, however, it would be possible to arrive at analytical findings that differ from ours were the lag period changed.

3 Since foreign exchange rates and oil prices have an enormous impact on Japanese prices, we also performed a three-variable VAR Granger Test in which import prices, which directly reflect these movements, served as an exogenous variable. The results were not, however, significantly different.

real economy, we confirmed that share prices lead both real GDP and its component items (domestic private demand, private-sector consumptive expenditures, private-sector capital investment, etc.).

Time correlations

We next examined time correlations between share prices and other variables. We obtained the highest coefficient of correlation for real GDP and other real economic indicators for the full sample period, at approximately 0.5 with a lead of one year or less. We also divided the sample into smaller sub-periods (first quarter 1970 to fourth quarter 1974, first quarter 1975 to fourth quarter 1984, and first quarter 1985 to second quarter 1997). While the correlation was, for the most part, lost for the second sample period, the sub-sample with the smallest rate of share price change as shown by standard deviation, there is a clear correlation for the first and third sub-samples, both periods in which the rate of share price change was large. We would note, however, that the lead period for share prices differs considerably between the two sub-samples. Share prices, in other words, do lead the real economy, but the extent of the lead is uncertain.

Coefficients of time correlation between share prices and other variables

	1970Q1-97Q2	1970Q1-74Q4	1975Q1-84Q4	1985Q1-97Q2
CPI	0.334 (t = -7)	0.920 (t = -7)	-0.040 (t = -7)	0.133 (t = -8)
WPI	0.398 (t = -6)	0.881 (t = -6)	0.143 (t = -6)	0.251 (t = -8)
GDP deflator	0.358 (t = -7)	0.887 (t = -6)	-0.074 (t = -8)	0.219 (t = -8)
Real GDP	0.489 (t = -2)	0.777 (t = -1)	0.198 (t = -2)	0.737 (t = -8)
Real domestic demand	0.619 (t = -3)	0.794 (t = -2)	0.244 (t = -3)	0.705 (t = -8)
Real private-sector consumptive expenditures	0.462 (t = -1)	0.782 (t = -1)	0.117 (t = -4)	0.647 (t = -8)
Real private-sector capital investment	0.554 (t = -4)	0.954 (t = -3)	0.502 (t = -2)	0.781 (t = -8)
Standard deviation of rates of changes of share prices	22.02	32.17	9.59	23.80

Note: The coefficient of correlation is the largest from the t = -8 period to the t = +8 period (t < 0 indicates that share prices lead).

Using the Probit method to develop economic forecasts from share prices

We next used an econometric technique called the "Probit Method" to see if share prices were able to forecast two values of economic orientation (expansion or recession) even assuming that there is little set quantitative relationship between share prices and serial economic variables like GDP. The Probit method regresses the existence of an event (in this case, economic recession) back to a variable that is thought to have some relationship to the event (in this case, share prices), seeking the probability of an event's occurrence.[4] The results indicate some degree of usefulness (Figure 2) as share prices accurately predicted the economic recession of the first half of the nineties.

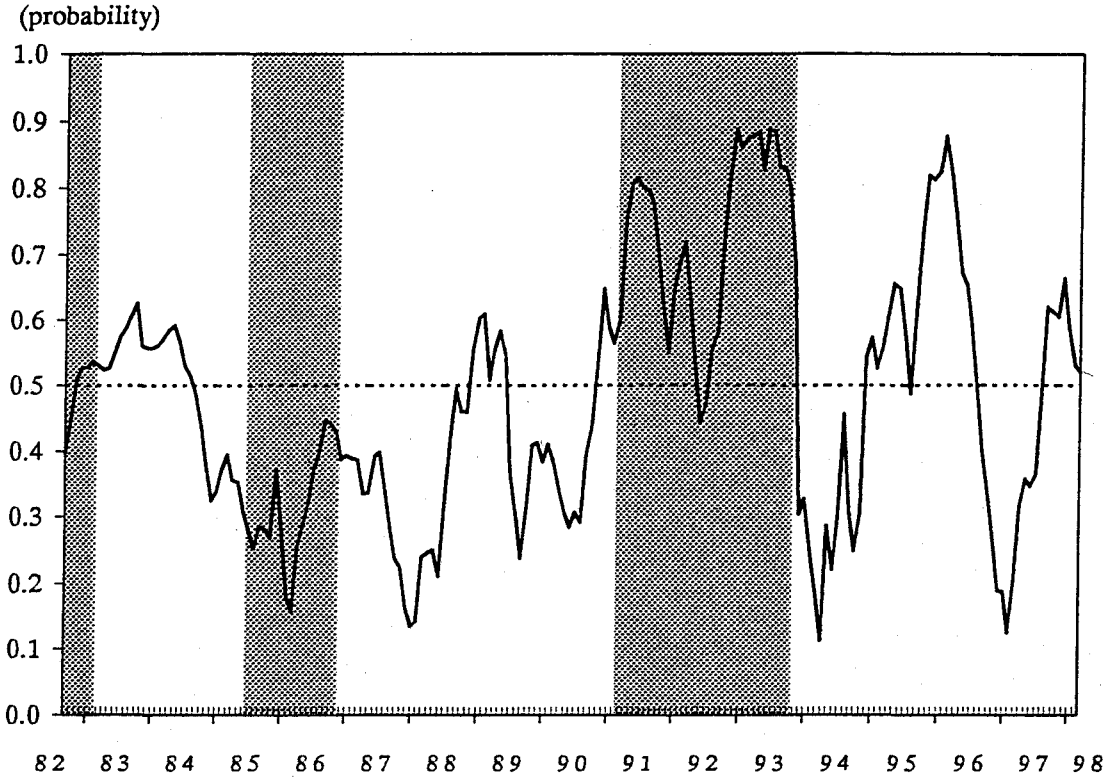
---

[4] It is possible to consider the stock market as containing two kinds of participants, those who are "optimistic" about the economic future and those who are "pessimistic". Share prices reflect which group is stronger.

Figure 2

Predictive power of share prices using the Probit method

TOPIX (year-to-year, forecast 7 months later)



Method of calculation: First, we regress the variables (in this case, TOPIX) from period (t) to period ($t + x$), and forecast period ($t + x + k$) based on this regression. Next, we regress again from period (t) to period ($t + x$), and forecast period ($t + x + k + 1$). We repeat the procedure by shifting the estimation period one term ahead at a time. The purpose of this test is to confirm whether we can predict future recessions (out of sample period) by using the existing data (in the sample period).

Notes: The shaded areas show recessions based on the standard date of business cycles published by *Economic Planning Agency*. Each value shows the probability of recession calculated from data up to a specific number of months (in this case, seven) before the prediction period.

Source: Tokyo Stock Exchange.

2. Distinguishing characteristics of the formation of Japanese share prices

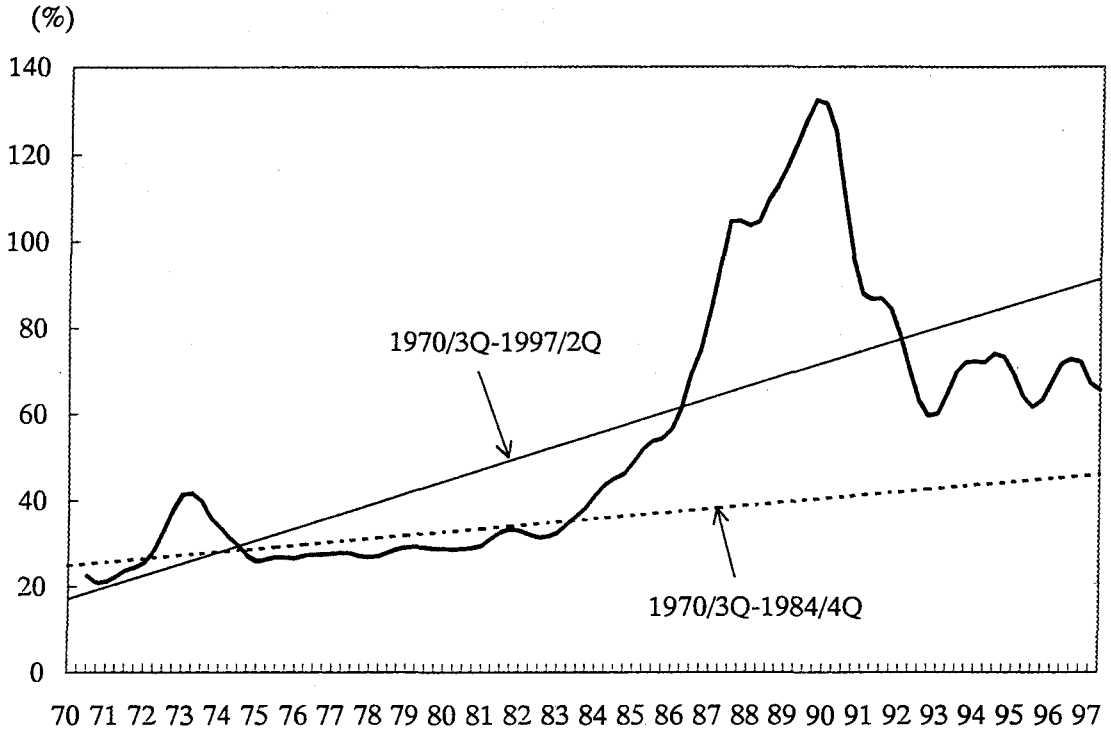
We have so far verified the usefulness of share prices as information variables for policy makers. This section focuses on the relationship between share prices and land prices as one of the distinguishing characteristics of past Japanese share price formation.

Relationship between market capitalisation and nominal GDP

We begin by looking at the long-term relationship between market capitalisation and nominal GDP (Figure 3). During the late eighties, the ratio of market capitalisation to GDP rose well beyond previous trend lines, but in the nineties it fell rapidly. This indicates the possibility that a bubble, which cannot be explained by any change in fundamentals, boomed and busted at this time.

Figure 3

The ratio of market capitalisation to nominal GDP



Notes: Gross market capitalisation consists of firms listed on the First Sections of the Tokyo Stock Exchange. Based on three-quarter moving average of end-month data. The lines indicate trends for each sample periods.

Sources: Tokyo Stock Exchange and Economic Planning Agency.

Relationship between the rate of share price change and the rate of land price change

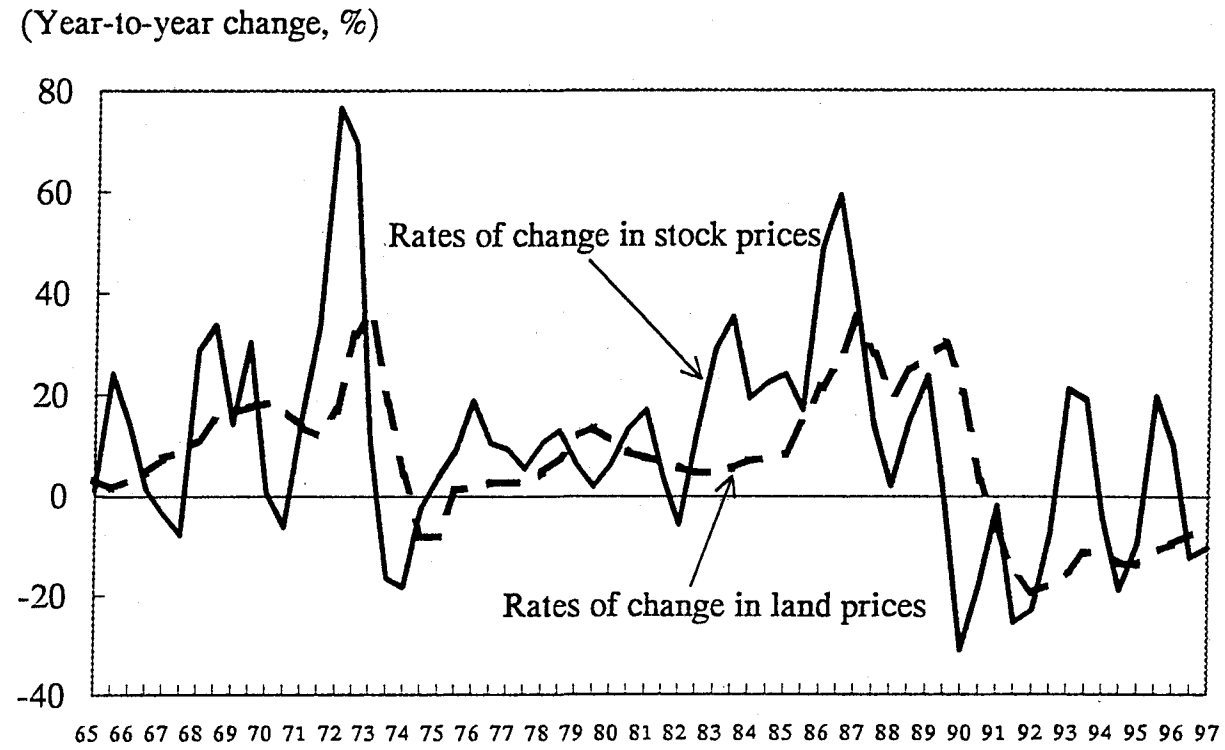
The late eighties saw substantial increases in land prices, which indicate that the bubble formed across asset prices as a whole. When the relationship between the rate of share price change and the rate of land price change is considered over the short term, the two appear to move differently, in part because of the large swings in the rate of share price change (Figure 4, top). Over the medium to long term, however, their movements are similar. Indeed, the rate of land price change is virtually a backward moving average[5] of the rate of share price change (Figure 4, bottom). Theoretically, land prices and share prices should be formed by common macroeconomic factors like nominal GDP and interest rates, so it is rational that they would be linked. However, it appears that the correlations between share prices and land prices are particularly strong in the case of Japan.

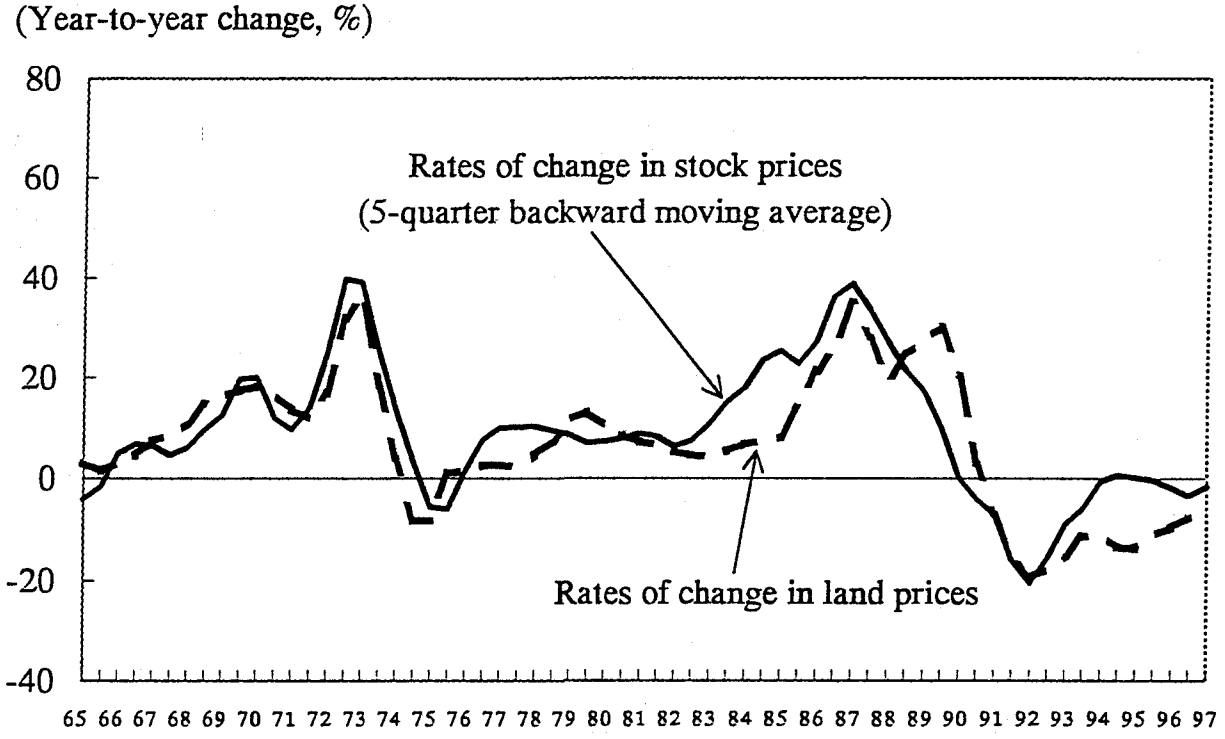
---

5 The reason for a "backward" rather than a "median" moving average is probably that land lacks liquidity and the land market therefore tends to react more slowly to changes in the environment than the stock market. From a technical standpoint, we would also note that there is an even longer lag required before prevailing market prices are reflected in land price indexes.

Figure 4

Changes in land and stock prices





Notes: Urban land price index (six major cities, average of all uses) used for land prices. It is assumed that the trend change in land prices in 1996H2 would continue in 1997. TOPIX used for stock prices. Figures for both land and stock prices are six-month data for April-September and October-March.

Sources: Tokyo Stock Exchange and Japan Real Estate Institute.

Relationship between corporate net asset values and market capitalisation

Japanese accounting standards do not use market values to appraise assets, so it is difficult to measure corporate net asset values in terms of the reacquisition cost (the market price), but a macroeconomic approximation can be made if a few assumptions are allowed (Figure 5, top). In the late eighties, rising asset prices drove up the value of land and shares owned by companies, which in turn caused a rapid increase in corporate net asset values. When this trend is overlaid on the trend lines for market capitalisation, an almost exact match is discovered (Figure 5, bottom). This indicates that the stock market of the late eighties valued the rise in corporate land and share assets (including unrealised gains) virtually without modification. As long as the market price of corporate assets provides an accurate reflection of the profitability of the asset – in other words, as long as it is close to the discounted present value of the profits that the asset will produce in the future – then it is natural that a change in the market price of an asset will be reflected in the market capitalisation of a company holding the asset. It is possible, however, that the stock market of the late eighties was valuing assets with the bubble that had formed in land prices.[6] We can assume that a mechanism then took root in which share prices valued in terms of rising land prices further boosted the value of the shares issued by companies that had extensive stock portfolios because of crossholding relationships.[7] If that was indeed the case, when the bubble burst and land prices began a sustained decline in the nineties, the reverse mechanism took root.[8]

The reasons behind strong ties between share prices and land prices

The discussion above should make it clear that the ties between share prices and land prices in Japan are far stronger than what would be expected from a general price arbitrage relationship between different classes of assets. That begs the question of why such linkage would exist, a question that is difficult to answer quantitatively, but which can be qualitatively addressed by the following points.

First, during the postwar reconstruction and high growth period, the price of both shares and land kept rising and both assets were used as a means of diversifying investments. As a result, there is a very strong arbitrage relationship between their prices. Although its profitability varied significantly, land has, in general, been considered an advantageous asset to hold, in part because of

---

6 In addition, an increase in the unrealised gains that is unlikely to lead to an increase in future cash flows – say, unrealised gains on land that the company is using for production activities or idle land that the company has no plans to use – should not be reflected in the share price at all, except if the company is an M&A target (in which case, the unrealised gains would be realised in the form of cash flow). During the late eighties, there were many attempts to justify share-price levels using the "Q ratio" (Market capitalisation/Gross market valuation of the company's assets – Gross liabilities) or market priced PBR. With hindsight, these can only be termed misleading. Such justifications confuse the theoretical breakup value of the company with its value as a going concern that produces revenues in the form of cash flow. By rights, the only assets that should be counted for such valuations is capital equipment. Similarly, Tobin's Q is an index of corporate strength in relation to asset holdings that takes share prices as a given, not an evaluation of share prices themselves (in other words, the idea has been reversed). Moreover, these theories and indexes have even less usefulness in cases like those currently being debated in the United States in which software and other intangible assets are not accurately measured in corporate accounts.

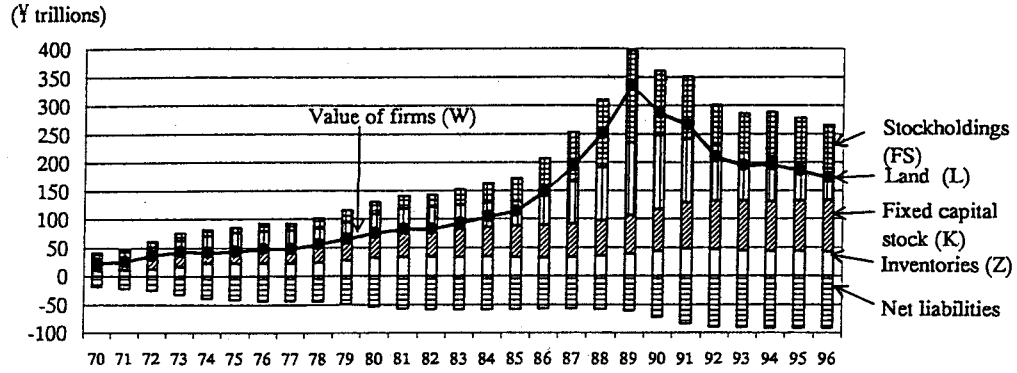
7 Taking the crossholding ratio as α, then a rise in the value of corporate assets other than shares (= 1) would have the effect of increasing the market capitalisation of the sector as a whole by $1 + \alpha + \alpha^2 + \alpha^3 + \ldots\ldots = 1 / (1 - \alpha)$.

8 However, the timing of the market's downturn indicates that share prices were the leader. Share prices turned in 1990 and land prices not until 1991. What probably happened was that the highly liquid stock market was quicker to react to the increased risk of land price drops brought by changes in macroeconomic conditions (higher long-term interest rates), and government moves to clamp down on land prices (the imposition of regulations on total lending to the real estate industry).

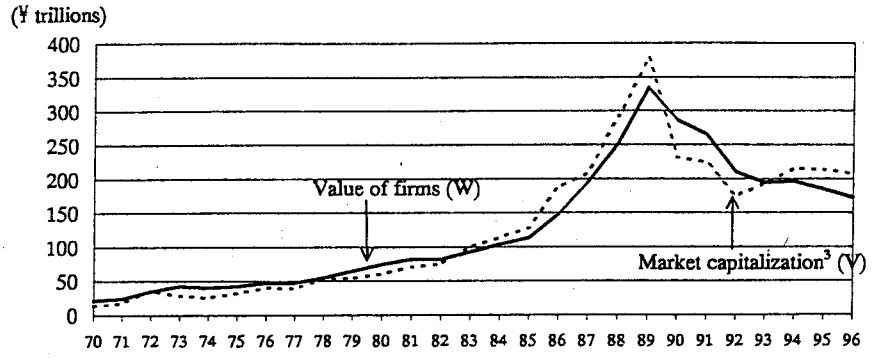
Figure 5

Assessment of the value of firms[1]

Value of firms in terms of replacement cost[2]



Value of firms in terms of replacement cost and market capitalisation



[1] Figures are estimated by the Bank of Japan, based on firms listed on the First and Second Sections of the Tokyo Stock Exchange excluding banking, insurance, securities and other financial services industries.

[2] Value of firms in terms of replacement cost (W) = *net asset value of firms* = $K + Z + L + FS + FA - B$, where:

K = fixed capital stock - land value (at book value) (aggregate number of firms listed on the First and Second Sections of the Tokyo Stock Exchange according to NEEDS),

Z = gross value of inventories (according to NEEDS),

L = value of land at market value. For 1995 and earlier figures, derived by multiplying the non-reproducible tangible asset/cash and deposits ratio, in the "non-financial corporate enterprises" sector in Annual Reports on National Accounts, by cash and deposits according to NEEDS. For 1996 figures, calculations based on year-to-year changes in the urban land price index (six major cities, average of all uses),

FS = total value of stockholdings at market value = stockholding at book value (securities holding (according to NEEDS) x ratio of stock/securities (according to Financial Statements of Incorporated Business, Quarterly)) + unrealised gains on securities held by firms (according to Shuyo Kigyo Keiei Bunseki and NEEDS) for 1994 figures. For 1993 figures and earlier, calculations based on year-to-year changes in stockholdings at market value in the "non-financial corporate enterprises" sector in Annual Reports on National Accounts. 1995 and 1996 figures based on year-to-year changes in Market Capitalisation,

FA = financial assets (excluding stockholdings) = gross value of assets (according to NEEDS) - fixed capital stock (K) - inventories (Z) - land (at book value) - stockholdings (at book value),

B = gross liabilities (according to NEEDS)
Net liabilities - gross liabilities (B) - financial assets (excluding stockholdings) (FA).

[3] Market capitalisation = (gross value of stock of firms listed on the First and Second Sections of the Tokyo Stock Exchange at market value - gross value of stocks of banking, insurance, securities and other financial services industries at market value) / number of listed firms x number of sample firms in NEEDS.

Sources: Economic Planning Agency, *Annual Reports on National Accounts*, Ministry of Finance, *Financial Statements of Incorporated Business, Quarterly*, Bank of Japan, *Shuyo Kigyo Keiei Bunseki* (*Analysis of Financial Statements of Principal Enterprises*), and Nihon Keizai Shimbun, Inc., *NEEDS* (*Nikkei Economic Electronic Databank System*).

regulatory factors (the tax code and land use regulations).[9] The result has been to obfuscate the price formation standards for land and has kept land prices rising at the same rate as share prices.

Second, in the postwar period lending has generally been secured with real estate. This has induced a process where rising land prices increase corporate fund-raising abilities, which in turn spurs an expansion in capital investment and corporate profits and subsequently translates into higher share prices.

Third, share crossholding arrangements between companies have reinforced the linkage between land and share prices by encouraging the stock market to value companies in terms of their net assets.

In Section 1 we confirmed the usefulness of share prices as a predictor of real economic activities. As far as the Granger test results and time series correlations show, share prices lead particularly strongly such component items in real GDP as domestic private sector demand and private sector capital investment. Also, in another paper using Granger tests and time series correlation analyses to verify the leading relationship of land prices to real economic indicators, we obtained the same results as for the share prices.[10] Therefore, share prices and land prices have a strong relationship and are probably both useful as an information variable for real economic activities.[11]

3. Share price valuation using the framework of a dividend discount model

In Section 2 we worked from the assumption that the stock market assesses corporate net asset values and went on to consider the formation of share prices since the bubble. In this section, we analyse share price formation using the framework of a "dividend discount model", which expresses share prices as the present value of the dividends (or the profits that are their source) produced by the company in the future. More specifically, we will use the fact that the yield spread (long-term interest rates – earnings yield), which is often employed as a standard for valuing share prices in relation to interest rates, is equal to the difference between the expected growth rate for nominal corporate earnings minus the risk premium to examine the factors behind the recent share price slump in terms of these two measures. Below is an outline of the framework used.

We will assume that current nominal earnings per share (E) increase year to year by a fixed growth rate (g). We can therefore use the following formula to calculate the present value (P, equal to the share price) of the stream of future earnings discounted for the rate of yield demanded by investors (δ).

---

9 The effective rates of both the inheritance and the land-holding taxes were kept extremely low. In addition, land-use regulations were often administered ambiguously, which allowed, for example, prices to form for agricultural land on the assumption that it could be converted to residential or commercial use. We must also note the influence of the postwar "land myth" (that "you will never lose by owning land" or that "land is the most advantageous asset to invest in").

10 The basis for share prices, corporate profitability, is strongly influenced by foreign demand, whereas the basis for land prices, rent, is assumed to depend on private sector domestic demand. Therefore, it is natural that land prices are useful as an information variable, leading, particularly, private sector domestic demand.

11 Asset prices lead the real economy not only because market expectations anticipate future changes in macroeconomic conditions, but conceivably also because changes in share prices themselves exert a direct influence on demand and spending through the wealth effect on households and changes in the cost and availability of corporate funding. However, our purpose in this paper is not to discuss the transmission mechanism between share prices, land prices, and real economic activities. Hence, we refrain from delving any further into these issues here.

$$P = \frac{E}{1+\delta} + \frac{E(1+g)}{(1+\delta)^2} + \frac{E(1+g)^2}{(1+\delta)^3} + \cdots\cdots$$

$$= \sum_{n=1}^{\infty} E(1+g)^{n-1}/(1+\delta)^n = \frac{E}{\delta - g}$$

$$\therefore \frac{E}{P} (= Earnings\ per\ share / price < Earnings\ yield >) = \delta - g$$

The rate of yield demanded by investors (δ) will probably be the long-term interest rate (r) plus a risk premium (ρ), so that:

$$\frac{E}{P} = \delta - g = r + \rho - g$$

$$\therefore Yield\ spread = r - \frac{E}{P} = g - \rho$$

The price/earnings ratio and the yield spread

Price/earnings ratios since the late eighties show large upwards and downwards shifts, with peaks coming in 1987 and 1994. Current levels are about average (Figure 6, top). Evaluations of share price and price/earnings ratio levels must, however, take account of the correlations with interest rates levels. The yield spread is the difference between long-term interest rates and the earnings yield, which is the inverse of the price/earnings ratio. Trends show that an average line of 3.5% held until the early nineties, but since 1995 the yield spread has moved substantially downwards and share prices would, superficially, appear to be "cheap" (Figure 6, bottom). As we have already discussed, a contraction in the yield spread would, in theory, indicate a decline in expected earnings growth rates or an expansion in the risk premium, or perhaps both. These factors must be taken into account when evaluating current share price levels. In the pages that follow, we consider the background to changes in the yield spread in some detail, but before doing that we must make two adjustments to the price/earnings ratio in order to more accurately capture yield spread levels.

The first adjustment is to correct for the influence of share crossholding arrangements (see Appendix A for the correction method). Share crossholdings have no direct impact on corporate profitability and so, in theory, do not affect share prices.[12] However, they are generally thought to have the effect of raising the apparent price/earnings ratio.

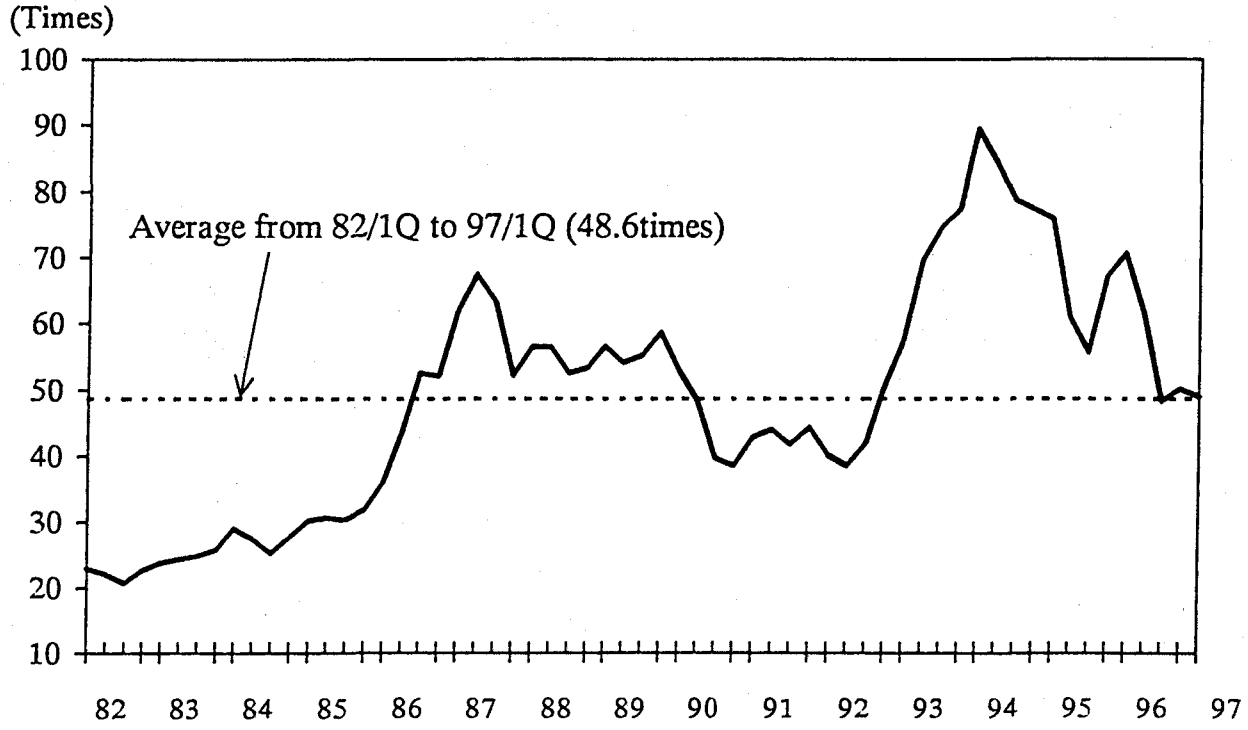
The second adjustment is to correct for business cycles (see Appendix B for the correction method). If we assume that near-term corporate profits will undergo large swings because of the business cycle, but that the expected growth rate for nominal earnings remains constant, then when the market predicts the stream of future earnings, the present value of earnings will differ from actual earnings and will be closer to the trend line. Therefore, if the economy is currently in recession and the markets expect corporate earnings to recover in the future, the price/earnings ratio will be on the high side. Likewise, if the economy is currently robust but the markets expect corporate earnings to decline in the future, then the price/earnings ratio will be on the low side.

---

[12] Share crossholdings between companies have no impact on the actual value of a company because the increase in dividend income that comes from the shares that a company holds will be offset by dividends paid out to companies that hold its shares. This can be verified from a simple numerical example. However, crossholdings and their unwinding may have a short-term impact on share prices via the supply and demand mechanism, and this will be more the case the greater the incompleteness of the market and the asymmetry of information among participants.

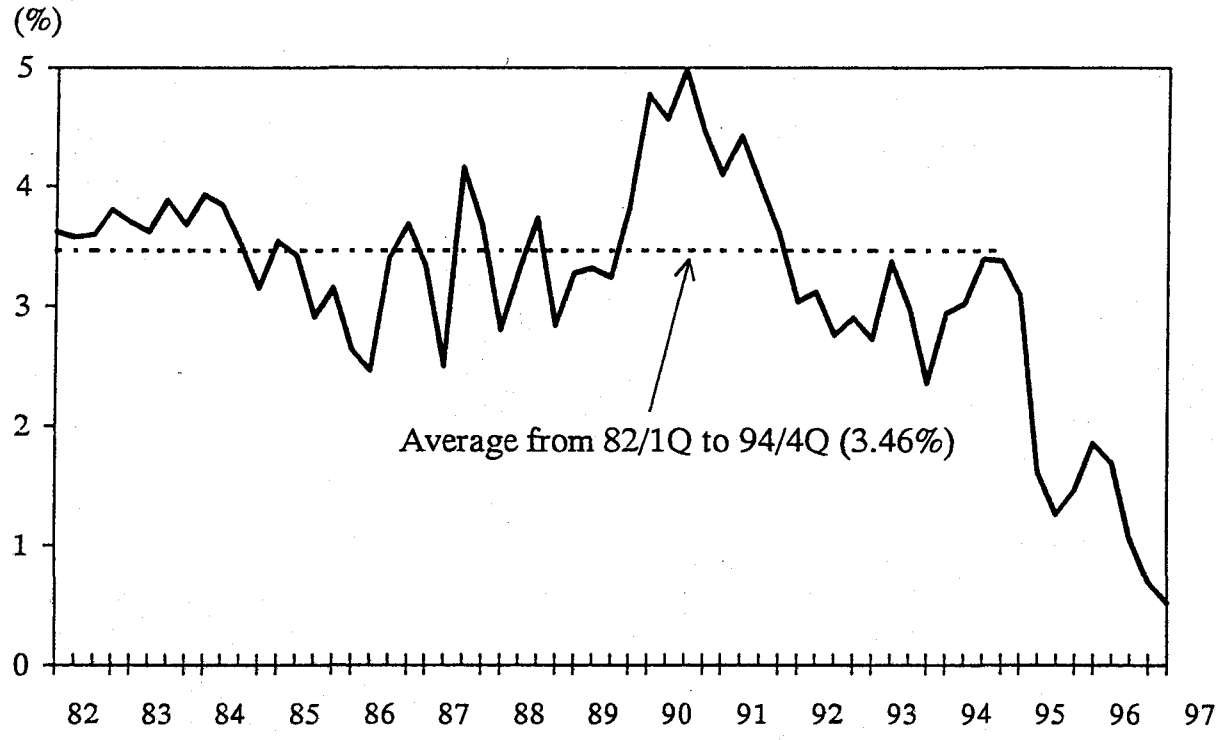
Figure 6

Price/earnings ratio



Source: Daiwa Research Institute.

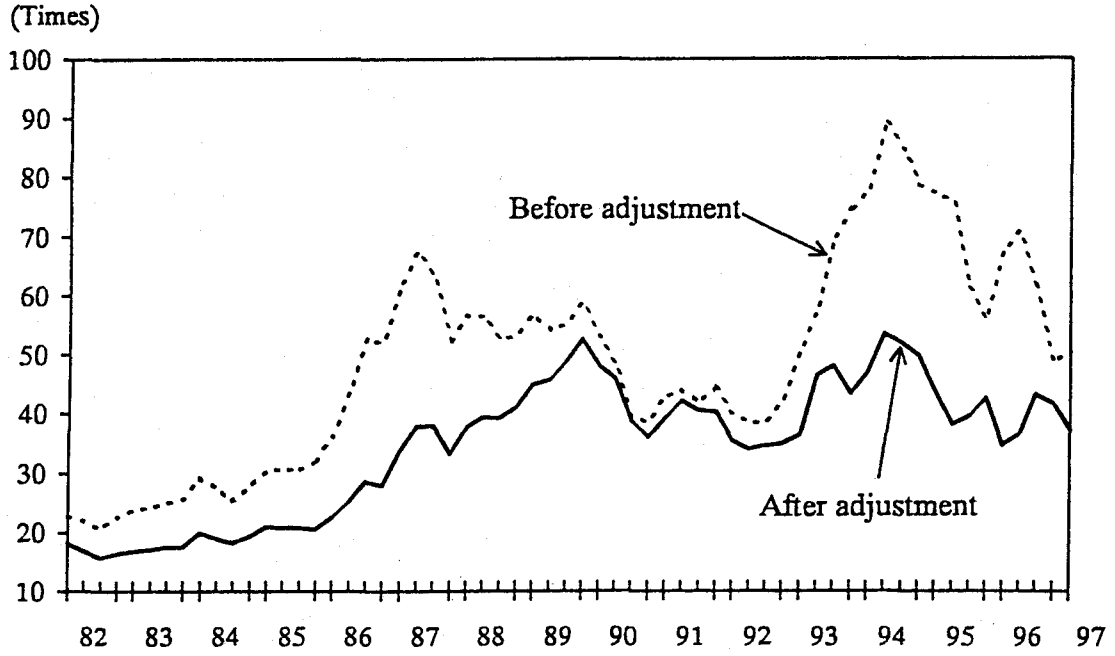
Yield spread



Notes: Yield spread = yield on government bonds (10-year) - earnings yield = Expected growth rate of firms' nominal earnings - risk premium in stock markets. Data for "Banks" are excluded from 1996Q1 and Q2.

Figure 7

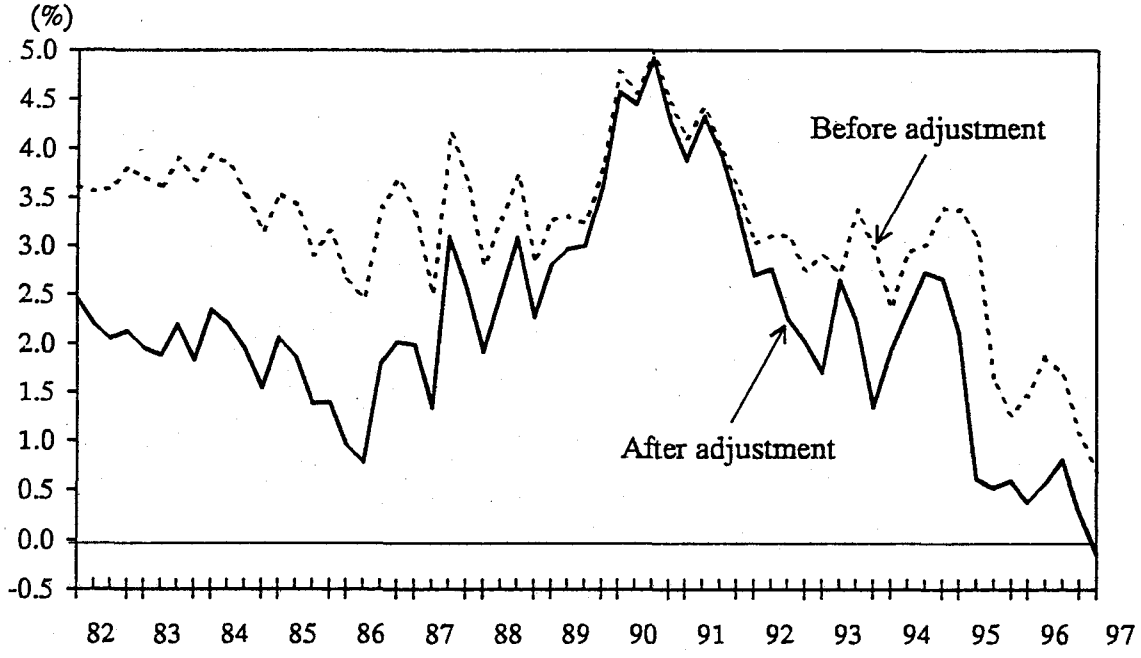
Adjusted price/earnings ratio



Method of calculations: *PER* after adjusting for the firms' share crossholding factor = *PER* x (1 - θ) / (1 - *D* x θ), where θ is the share crossholding ratio and *D* the payout ratio. *PER* after adjusting for the firms' share crossholding factor and business cycles factor = Coefficient for adjusting business cycles factor x *PER* after adjusting for the firms' share crossholding factor.

Notes: The data for "Banks" are excluded from 1996Q1 and Q2. *PER* is expected *PER* based on the survey by Daiwa Research Institute. The payout ratio is from the National Conference of Stock Exchanges and the share crossholding ratio is from Daiwa Research Institute. In adjusting for the business cycles factor, we used the GDP gap.

Adjusted yield spread



Notes: Yield spread = yield on government bonds (10-year) - earnings yield = Expected growth rate of firms' nominal earnings - risk premium in stock markets. Data for "Banks" are excluded from 1996Q1 and Q2.

When the price/earnings ratio is adjusted for both these factors, which levels appear lower than unadjusted price/earnings ratio[13] (Figure 7, top). Similarly, the fluctuations seen since the late eighties are smoothed out.

We are now ready to use the corrected price/earnings ratio to trace the yield spread (Figure 7, bottom). One can see that it rose rapidly in the late eighties and declined rapidly after 1991. This paints a much clearer picture of the changes in share price levels in relation to interest rate levels during the formation and collapse of the bubble.[14]

Expected growth rate of nominal earnings and the risk premium

We will calculate the risk premium using the yield spread and assuming a constant expected growth rate for nominal earnings below. Being a remainder, the risk premium will obviously change somewhat according to assumptions about the expected growth rate of nominal earnings, so results must be viewed with a certain degree of latitude. Even so, attempts such as ours are useful in viewing share price formation trends over the medium term.

For the expected growth rate of nominal earnings we use the medium-term real corporate growth rate forecasts found in the *Survey of Corporate Activities* published by the Economic Planning Agency.[15] From this base we add an expected CPI inflation rate[16] derived from an adaptive expectations model, thus obtaining a closer approximation. The expected growth rate of nominal earnings thus obtained was over 9% at the end of 1982, but during the eighties, it declined to the 3% level before turning upwards again in the early nineties. At the end of 1991, it stood in the 6% range. It has again undergone a decline and is currently in the 2% range (Figure 8, top).

The next step is to use the adjusted yield spread and the figures for the expected growth rate of nominal earnings to derive the risk premium observed in the markets. Our findings indicate that the risk premium declined rapidly in the late eighties and was at one point close to zero before rising rapidly in the nineties, peaking in 1992, declining through 1994, and then turning upwards again in 1995 (Figure 8, bottom). In as much as it is calculated after the fact based on the expected growth rate of nominal earnings and several other assumptions, this risk premium should be viewed as a "balance" in which are subsumed the swings in market expectations and mistakes in market forecasts. It is hard to consider it an accurate measure of the risk premium included in the a priori rate of return demanded by investors (this is the same as the discount rate in the dividend discount model). In fact, it is likely that the rapid decline in the risk premium at the end of the eighties reflected the stock price bubble (a stock price movement that departs from fundamentals).

---

13 Even the corrected levels show price/earnings multiples of about 35, which are high in comparison to the United States (the S&P 500 has a multiple of about 20). When the price/earnings ratio is used to make international comparisons between markets, differences in statutory reserve requirements, fixed asset depreciation, and other corporate accounting practices must be taken into account above and beyond interest rate levels. One cannot simply conclude on the basis of the price/earnings ratio that a market is "dear" or "cheap". Other things being equal, the price/earnings ratio will be higher the lower interest rate levels go. Some analyses also indicate that the price/earnings ratio of Japanese companies would be considerably lower were US-style accounting practices used.

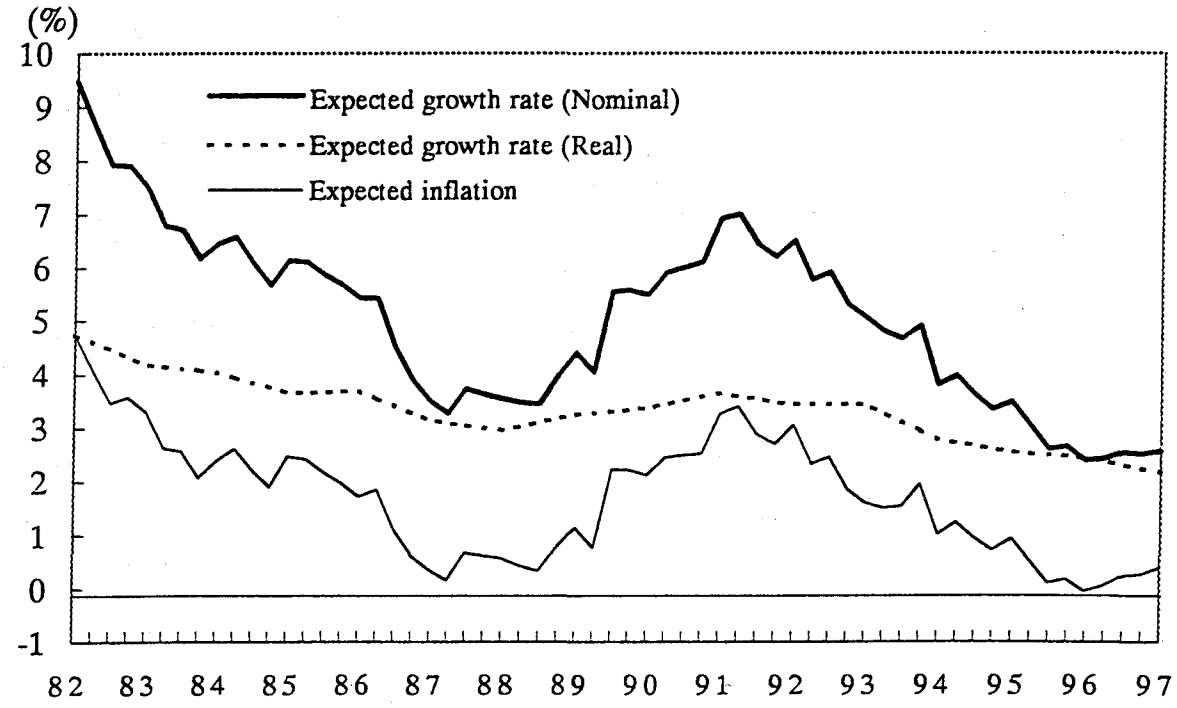
14 A bubble is a price movement that departs from fundamentals. When a price movement containing a bubble is later explained in terms of a fundamentals model, the yield spread and the risk premium (discussed later) are likely to show "excessive" swings.

15 Ideally, the expected growth rate would be a measure of investor expectations, which, if one assumes information to be asymmetric, may not match the expected growth rate of the companies themselves. However, data constraints force us to use the values from the corporate survey.

16 Approximated with a lagged eight-term moving average of term-to-term CPI growth.

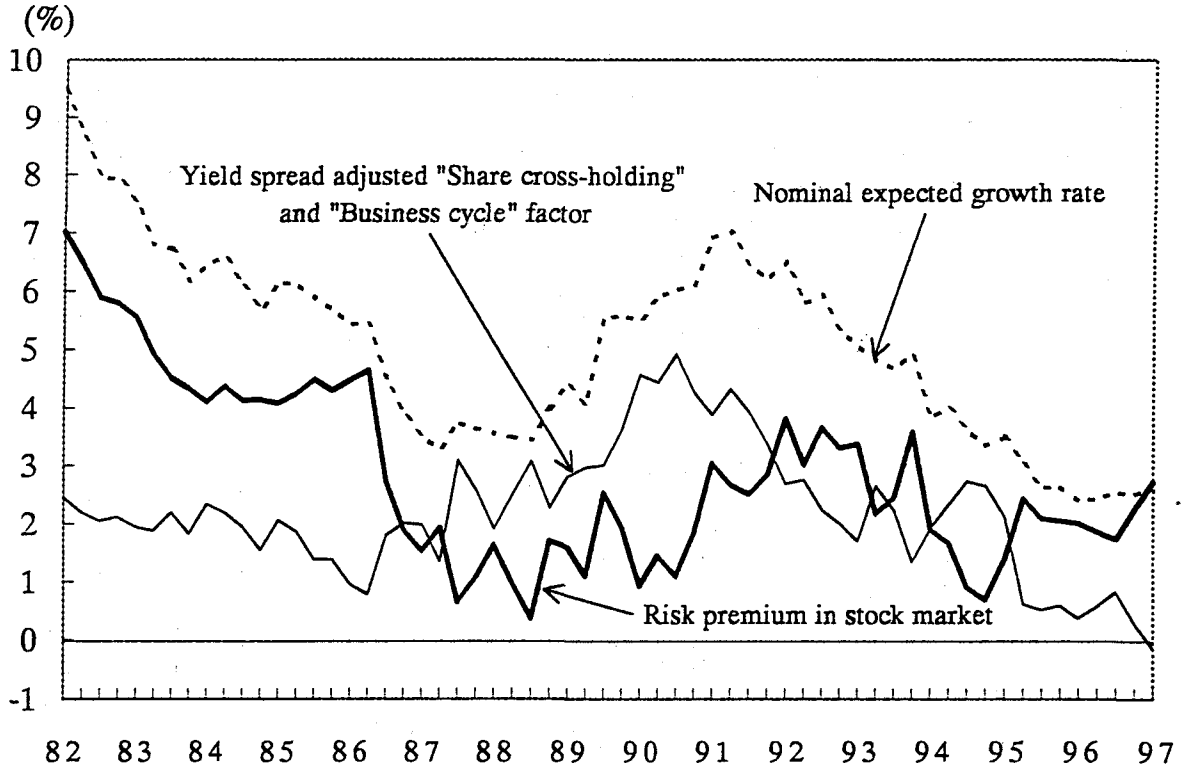
Figure 8

Expected growth rate of firms' nominal earnings



Notes: Expected growth of firms' real earnings is based on Economic Planning Agency, *Corporate Behavior Survey*. Expected inflation is calculated from an Adaptive Expectations Model.

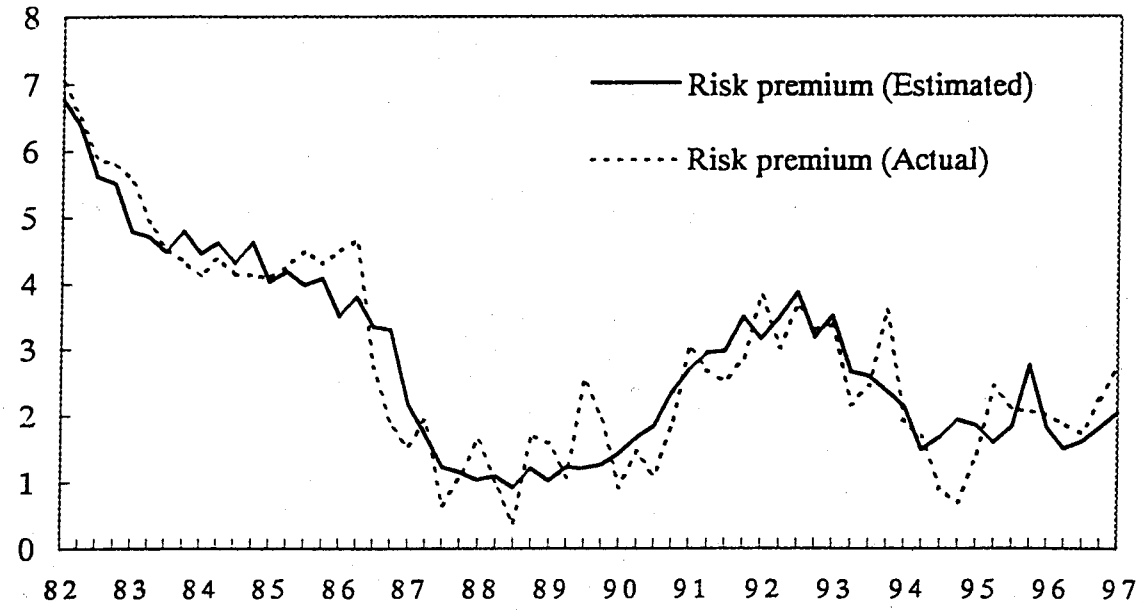
Risk premium in the stock market



Notes: *RP* = Risk premium in stock market = *g* - *YS*, where *g* = Expected growth rate of firms' nominal earnings and *YS* = Yield spread adjusted "Share crossholding" and "Business cycle" factor.

Figure 9

Theoretical risk premium in the stock market



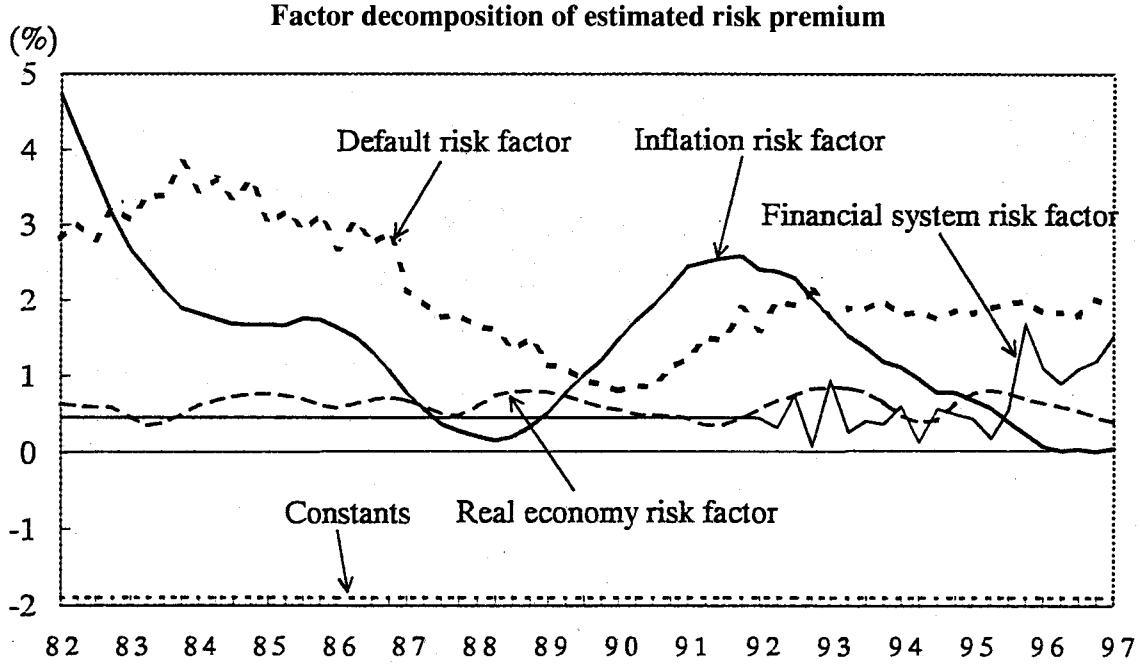
Method of calculation: Risk premium in stock market = -1.89 + 0.81 x inflation risk factor +0.18 x real economy risk factor
(-3.9) (11.4) (1.7)
+ 4.22 x Default risk factor + 6.03 x Financial system risk factor
(9.8) (3.4) ( ) = t-value

Sample period = 1984Q1-1997Q1

Adjusted R-square = 0.860 S.E. = 0.586 D.W. = 1.512

Variables: Inflation risk factor: 8-quarter backward moving average of year-to-year change in CPI; real economy risk factor: 12-quarter backward standard deviations of year-to-year change of IIP; default risk factor: bankruptcy rate of firms; financial system risk factor: CD(3M) - TB(3M).

Factor decomposition of estimated risk premium



In other words, there are many problems in the estimation of the risk premium. Nonetheless, we have regressed the risk premium that we calculated on other variables considered likely to influence the risk premium. This was done because it provides a means for exploring the factors behind share price formation using the framework of the fundamentals model (Figure 9, top). As proxy variables for earnings and interest rate fluctuation risks, we used the CPI and industrial production; as proxy variables for credit risk, we used the corporate bankruptcy rate and the CD-TB rate spread, giving us a total of four variables.[17] Our estimates indicate that the decline in the inflation (CPI) and default risks (corporate bankruptcy rate) contributed to the decline in the risk premium seen in the late eighties (Figure 9, bottom). In the nineties, both of these variables rose, which caused the risk premium to rise. Then in the mid-nineties, inflation risk again declined, but default risk remained high and financial system risk (the CD-TB rate) rose, limiting the declines in the risk premium.

The current risk premium is in fact at lower levels than it was in the early eighties, which could indicate that there is still room for the risk premium to rise (and therefore for share prices to decline). Certainly, the bankruptcies of medium-sized constructors illustrate that as long as the "negative" legacy from the bubble continues, there will be room for the premium against credit risk to expand. Nonetheless, the expected inflation rate has vastly declined from what it was in the early eighties, and if the markets interpret this as meaning that there is little risk of a large rise in long-term interest rates, it would not necessarily be irrational for the risk premium as a whole to be lower than the levels of the early eighties.

Factors in the Japanese share price slump

Let us turn once again to the dividend discount model and re-examine the factors at work in share price formation.

1) In the early eighties both the price/earnings ratio and the yield spread were stable (when both are adjusted for share crossholding and cyclical factors, and so throughout). During this period, both the expected growth rate of nominal earnings and the risk premium declined.

2) In the late eighties, both the price/earnings ratio and the yield spread rose. During this period, the expected growth rate of nominal earnings rose, while the risk premium remained low.

3) In the nineties, the price/earnings ratio remained at roughly the average levels of the late eighties, but the yield spread consistently declined. During this period, the expected growth rate of nominal earnings declined and the risk premium rose.

The question is then how to view this analysis in light of the relationship between share prices and land prices – the high probability that during the late eighties, the stock market valuation of corporate net assets took at face value the rise in land prices, which itself contained a bubble.[18]

It can be said that the rapid decline in the risk premium during the late eighties corresponded with the bubble portion of land price valuation. Indeed, if the risk premium is explained in terms of a model that regresses all variables, then a bubble-inspired rise in land prices will be observed as a decline in credit risk. In the late eighties, the default risk (corporate bankruptcy rate)

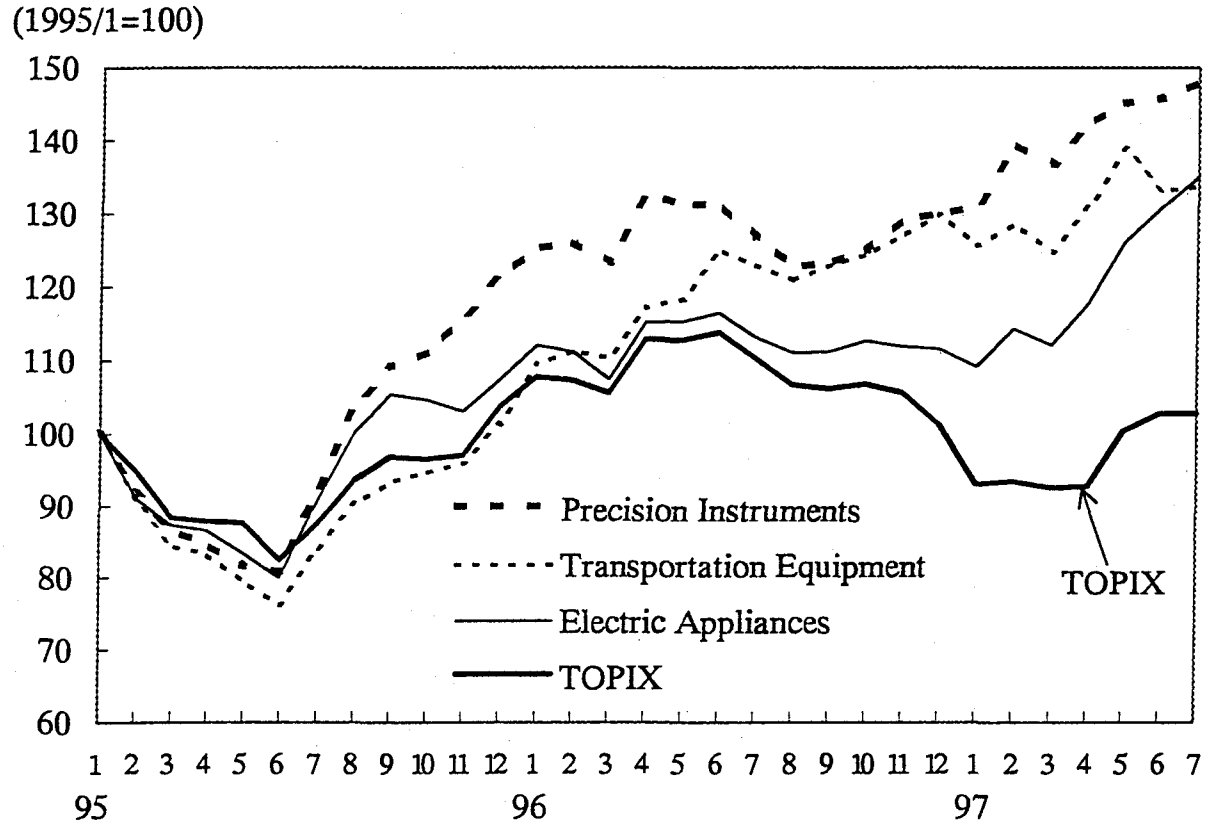
---

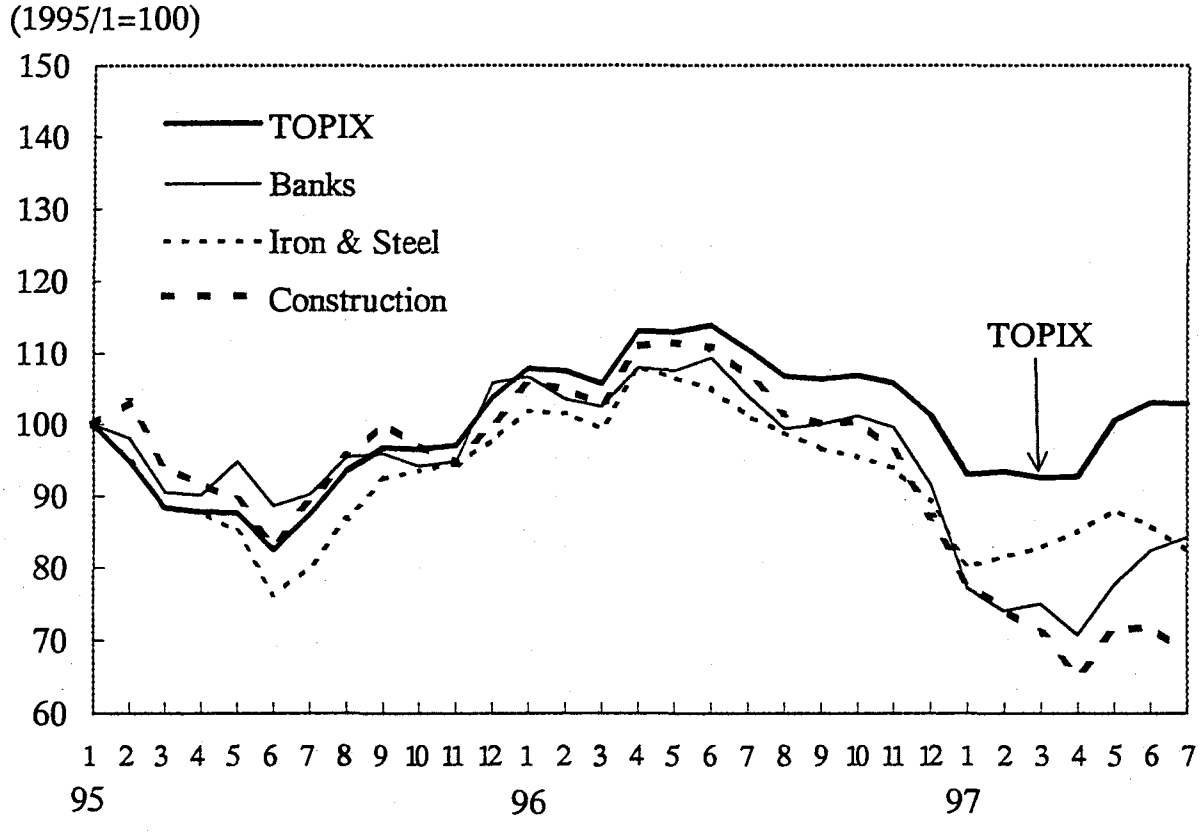
[17] We added share-price volatility as an explanatory variable to serve as a proxy for price-fluctuation risks, but this had no significance. Industrial production (standard deviation from the previous year) may be considered a proxy for price fluctuation risk in this regression.

[18] In the late eighties, it was evident that low interest rates and high expected growth of nominal earnings acted to push up both land and share prices. The issue here is how to comprehend, within the framework of Dividend Discount Model, the fact that the stock market was influenced by the land price bubble which is thought to be included in the increase in the value of firms' net assets.

Figure 10

Stock price index by industry





Source: Tokyo Stock Exchange.

declined sharply, and it is conceivable that a major part of this was the fact that rising land prices produced a rise in the collateral value of corporate assets. In other words, if one can assume that land prices will continue to rise or at least not decline, then it is probable that the stock market risk premium declined. Coming into the nineties, however, the reverse phenomenon was observed as land prices went into decline. Within the context of the dividend discount model, the decline in market capitalisation (the decline in share prices) that occurred almost in parallel with the decline in corporate net asset values caused by falling land prices can be captured as a rise in the risk premium due to higher credit risks. Since the mid-nineties, the default risk, as measured by the corporate bankruptcy rate, has been flat, but the financial system risk, as measured by the spread between the CD and TB rates, has risen, which has caused credit risk as a whole to rise. Thus the basic factor in the rapid decline in the yield spread during the nineties was the decline in the expected growth rate of nominal earnings, though the increase in the credit risk premium caused by falling land prices also played a role. This is what resulted in a slump in Japanese share prices in contrast to the booming markets in other industrialised countries.

We would note in conjunction with this that while share prices as a whole have been slumping in recent years, those for electric and precision equipment companies, which as far as corporate earnings and the risk premium go are less vulnerable to the impact of falling land prices, have been comparatively strong (Figure 10, top). Likewise, sectors like banking and construction that are very vulnerable to the effects of land price drops have seen major declines in their share prices (Figure 10, bottom). In other words, there has been contrasting developments among share prices.

4. Structural changes in the stock market

In the previous section we examined the factors behind the slump in Japanese share prices that has prevailed through most of the nineties, finding that it matched trends in macroeconomic factors, for example, the decline in the expected growth rate of nominal earnings and the drop in land prices. During this period several phenomena were observed in the stock market which seemed to augur changes in the market's structure. While it is not clear at this point what impact these phenomena have had on share prices, they do provide a wealth of hints about how to observe the stock market and share prices in the future, so they are described briefly in this section.

Changes in investors

Among the most pronounced changes in the stock market is the increased weight of foreign investors as players in the market. We divided investors into financial institutions, industrial corporations, personal investors, and foreigners, and charted their share of trading (by value) for the last ten years. In the late eighties, foreigners accounted for 11.5% of trading, but by the mid-nineties their share had soared to 27.8%, and in the first half of 1997 they have been responsible for 34.4% of trading, fully one-third of the money changing hands. On the other hand, the share of personal investors fell by half (15.9% in the first half of 1997) from 31.2% in the late eighties. The personal investors' separation from the stock market was probably caused by the after-effects of losses suffered when the bubble burst as well as the intensification of distrust in the stock market from repeated scandals of security companies.

Turning to the percentage of shares owned by different sectors, we find that the weight of personal investors declined between the end of 1985 (FY) and the end of 1990 (FY), while that of financial institutions and industrial corporations rose. Between the end of 1990 (FY) and the end of 1996 (FY), the weight of personal investors was flat, that of financial institutions and industrial corporations declined, and the weight of foreign investors rose sharply from 4.2 to 9.8%.

Share of trading (by value; %)

	1988-90	1991-93	1994-96	January-June 1997
Financial institutions	38.0	36.9	38.8	41.5
Industrial corporations	14.9	9.2	6.7	5.2
Personal investors	31.2	27.8	23.0	15.9
Foreigners	11.5	21.6	27.8	34.4
Others	4.4	4.5	3.7	3.0

Note: Totals for trading on the First and Second Sections of the Tokyo, Osaka, and Nagoya markets. Financial institutions include investment trusts, pensions, life insurance companies and other institutional investors.

Breakdown of share ownership

	End of FY 1985	End of FY 1990	End of FY 1996
Financial institutions	42.2	45.2	41.3
Industrial corporations	24.1	25.2	23.8
Personal investors	25.2	23.1	23.6
Foreigners	5.7	4.2	9.8
Others	2.8	2.3	1.5

Source: National Securities Exchange Council, *Report on the Survey of Share Distribution.*

Unwinding of share crossholding relationships

One of the reasons that ownership proportions have changed is probably the unwinding of share crossholding arrangements. During the late eighties, the percentage of shares in the portfolios of financial institutions and industrial corporations rose, in part because corporations and institutions took advantage of the rising share prices of this period to increase their capital, and some of the new shares issued were underwritten by other companies and institutions as part of crossholding arrangements. In the nineties, this has changed. Companies are unwinding their crossholding arrangements, and many of the shares involved are being picked up by foreigners, whose ownership percentage has increased by a corresponding amount. It is not just foreigners who have bought the shares being released; they are also going to pension funds, which are included among "financial institutions" in our statistics. At the end of 1990 (FY), pension funds owned only 0.9% of the stock in Japan, but by the end of 1996 (FY) their share had increased to 2.3%. This translates into a sharp decline for financial institutions other than pension funds, from 44.3 to 39.0% of the total.

"Crossholding" is, of course, one of the features that most distinguished the postwar Japanese economic structure, on par in importance with the main bank system, *keiretsu,* lifetime employment, and company-specific trade unions. Several merits have been ascribed to this system.

1) Corporate governance perspectives

The more stable shareholders a company has, the less risk there is that it will be the subject of a hostile takeover. Managers, who have usually been promoted from employees, are also able to run the company from a long-term perspective that emphasises the interests of the employees.

2) *Policy investment perspectives*

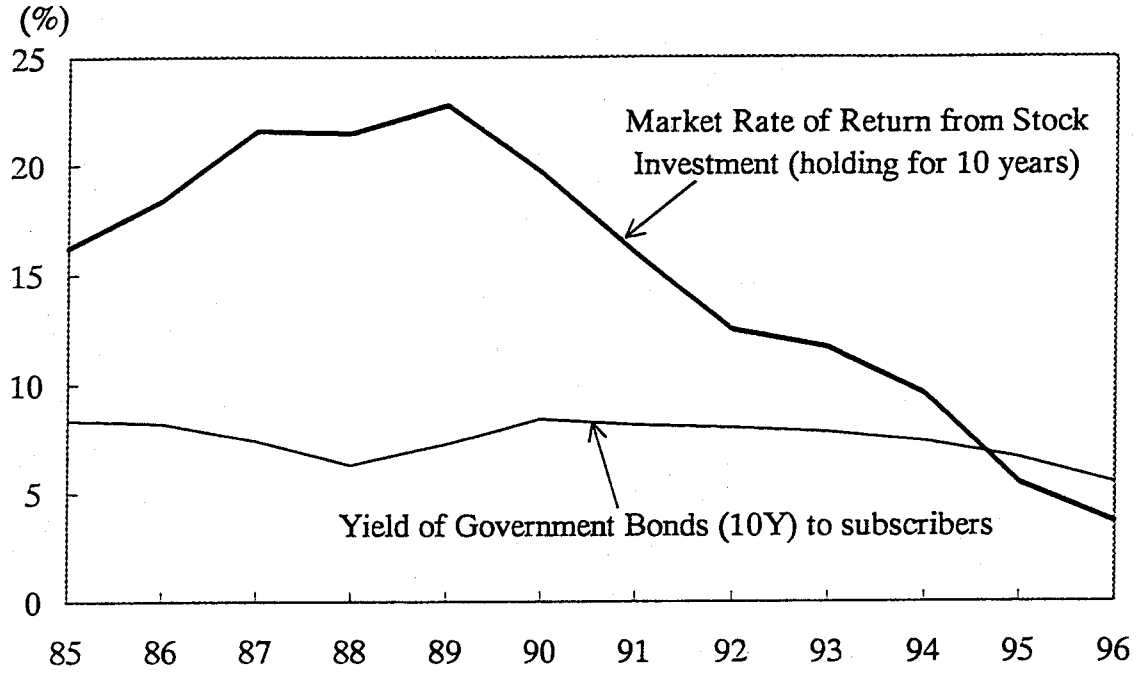
Crossholding enables companies to build long-term, stable trading relationships, which both reduces transaction costs and facilitates risk sharing. Shareholding arrangements between industrial companies and financial institutions lead to a reduction in "agency costs"; the institution is able to monitor corporate behaviour which reduces the credit risks, while the company is able to reduce its borrowing costs and increase the availability of loans.

3) *Higher unrealised profits*

The general rising trend for share prices gave shares in crossholding arrangements large unrealised profits that managers could use as a risk buffer. In other words, should the company be hit with an extraordinary loss that was difficult to cover out of recurring profits, it could realise the latent profits in its portfolio by selling shares at market prices and then, to re-establish the long-term relationships in its transactions, buying them back later on.

Figure 11

Market rate of return from stock and Government bond investment



Notes: The 1996 market rate of return on 10-year stock investment is the return/investment ratio when buying stocks at the average price in 1986 and selling them at the average price in 1996. Corresponding to market rate of return from stock investment, we used the average yield of 10-year Government bonds to subscribers in 1986 as the market rate of return from Government bond investment in 1996. Market rate of return on stock investment is calculated as follows (not only dividend but capital gain is added to the return from stock investment);

$$\textit{Market rate of return from stock investment} = \frac{\textit{Dividend} + \textit{Capital gain}}{\textit{Investment}} \times 100$$

$$= \frac{\textit{Dividend} + (\textit{Selling price} - \textit{Buying price})}{\textit{Buying price}} \times 100$$

Figures are calculated with a weighted average based on the aggregate market value of stocks listed on the First Sections of the Tokyo Stock Exchange.

Source: Japan Securities Research Institute, *Market Rate of Return from Stock Investment*.

The burst of the bubble in the nineties has changed this. In some cases, shares in crossholding arrangements have produced unrealised losses. In other cases, companies have had other losses to cover or needed to improve their cash flow and have, therefore, been forced to sell off crossheld shares for which there were still profits to be taken. From a macroeconomic perspective as well, expected growth rates have been in decline, but companies have needed to improve their earnings and meet the "structural adjustment" pressures, brought to bear by more intense international competition. This is forcing many to re-examine their business and capital relationships in the name of greater efficiency. We would point out that the prolonged share price slump has caused a substantial decline in the market average rate of return on equity investments (dividends plus capital gains divided by amount invested). Recently, equity investments held for a ten-year period have produced smaller returns than government bonds, which are considered a safe investment (Figure 11). These conditions will gradually force more and more companies to rethink their share crossholding arrangements, if only from the perspective of better investment efficiency.[19]

The internationalisation of investment yardsticks

In short, Japan is seeing its share crossholding arrangements unwind and a greater percentage of its shares going to foreign investors and domestic institutions (pension funds and the like), with signs of investment yardsticks moving in the direction of global standards. For example, there is a new emphasis on "return on equity" (ROE). The ROE of Japanese manufacturers has been in decline in the nineties because of the economic recession. Only recently has it bottomed out, but it is still not back to the average levels of the eighties, and the gaps with American companies are as wide as ever (Figure 12, top). Slumping ROE is basically a product of falling ROA (return on assets) (Figure 12, bottom). Improvements in ROE will require better investment efficiency and corrections to over-capitalisation. We would draw the reader's attention to the years 1984 and 1996, when there were roughly equal groupings of industries with rising and falling ROE. Compared with 1984, there were greater contrasts in the share prices' movements in 1996 (Figure 13). Obviously, there is no one single interpretation that can be put on these results. The economic environment was different in these two years and it is uncertain to what extent the markets had already discounted ROE in 1996, but it would be natural to see this as an indication that ROE was exerting a greater influence as an investment yardstick – not only were foreign investors emphasising ROE but domestic institutions have also been advocating greater use of ROE. These conditions are causing a greater number of corporate managers to explicitly list higher ROE among their business goals.

Another trend to be noted is the greater emphasis that institutional investors are putting on income gains, which has caused companies to compete on "payout ratios" and to make their dividends more elastic with respect to earnings levels. This represents an overhaul of traditional Japanese dividend policies, which were to minimise the amount of profit flowing out of the company and instead retaining profit inside for future investments, or to stabilise dividend amounts because crossholding relationships had produced a large contingent of stable shareholders. In the past, managers were content to let payout ratios swing widely over the business cycle.[20]

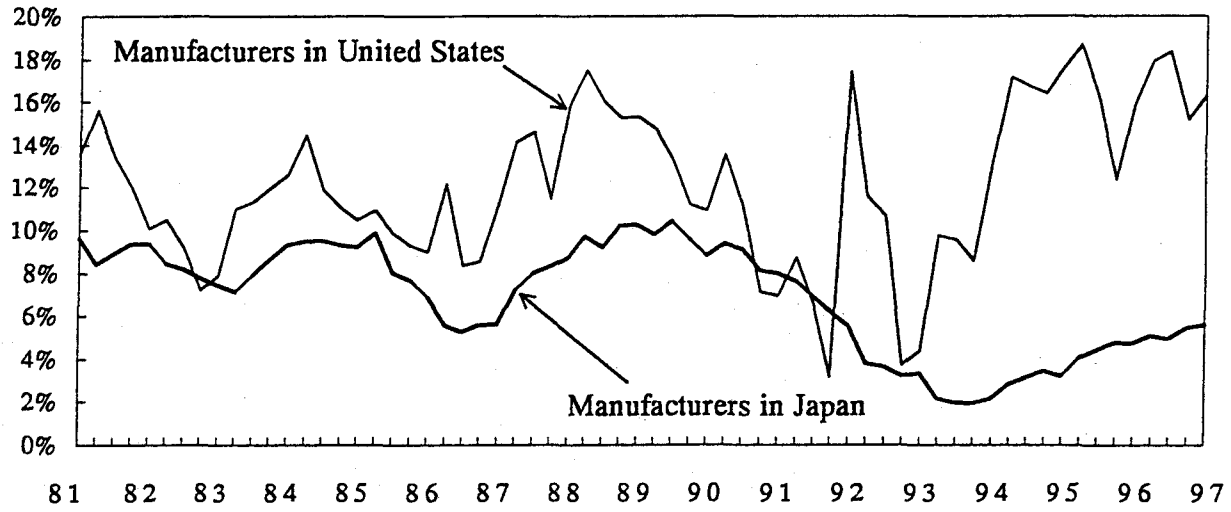
---

[19] Nonetheless, it would be premature to think that crossholdings will immediately unwind. This is a practice that is deeply entwined with corporate governance and other aspects of the economic and corporate structure and is unlikely to disappear very rapidly or easily. Surveys indicate that many managers still see value in crossholdings. What will probably happen, therefore, is that crossholdings will be gradually unwound as managers become more selective about whose shares they hold.

[20] As an illustration of the swings, the pay out ratio for all listed companies in Japan (2,267, including those in finance) was 30.3% in 1990, compared to 82.9% in 1994 and 60.8% in 1996.

Figure 12

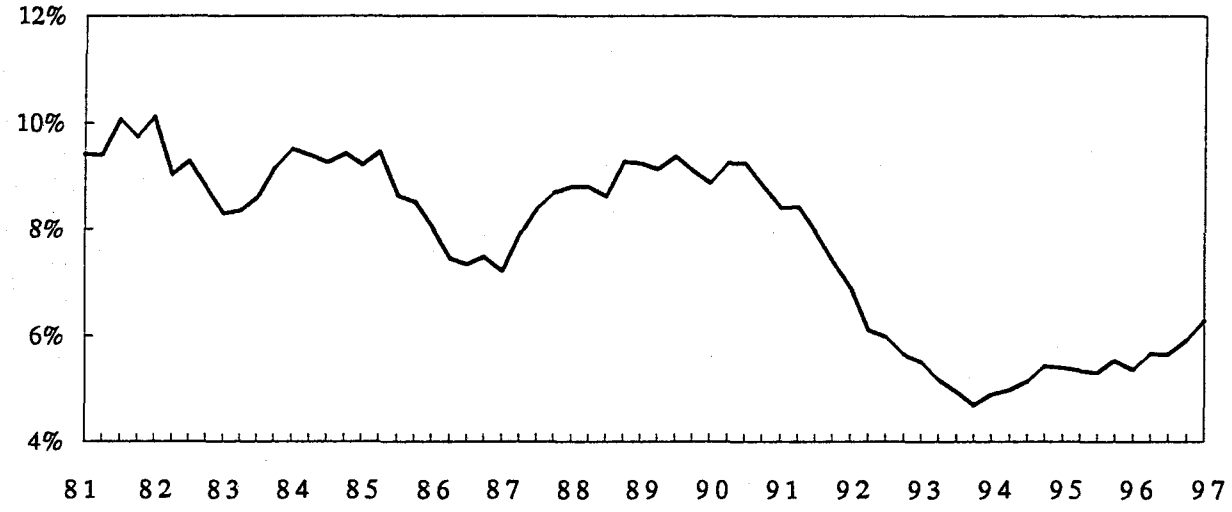
Rate of return on equity (Japan and the United States)



Notes: For Japan: *ROE = Current profits* x (1 - *Tax rate*) / *Own capital*; for the United States: *ROE = Profit for the current term after tax / Own capital.*

Sources: For Japan, Ministry of Finance, *Financial Statements of Incorporated Business, Annually and Quarterly*; for the United States, Department of Commerce, *Quarterly Financial Report for Manufacturing, Mining and Trade Corporations.*

Rate of return on assets (Japan)



Notes: *ROA = (Operating profit + Non-operating profit) / Assets.* The series is seasonally adjusted.

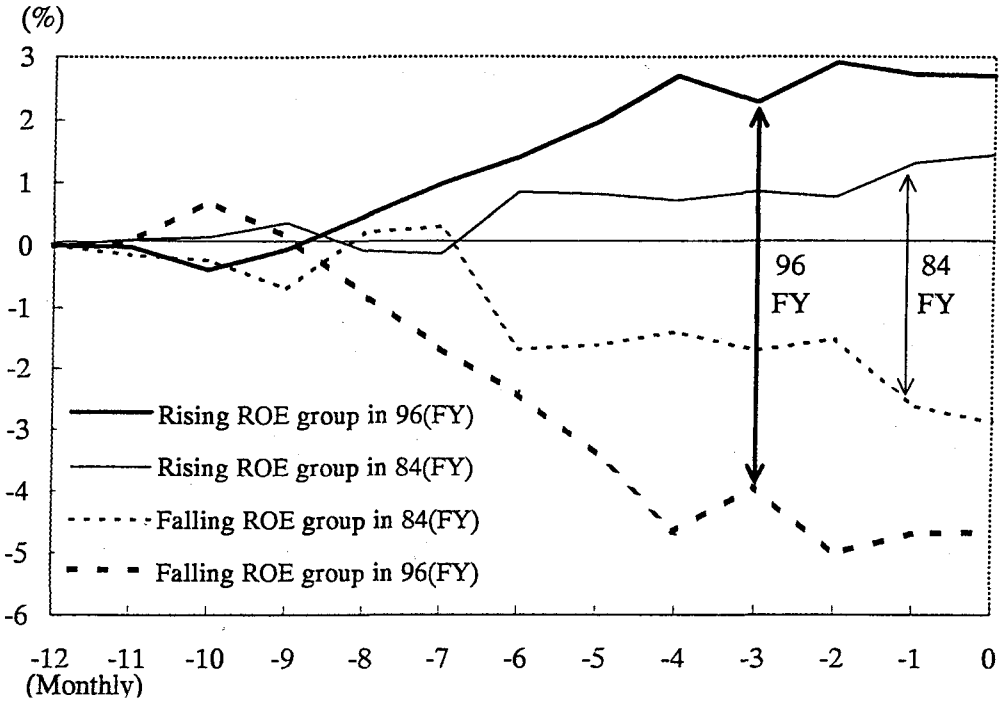
Source: Ministry of Finance, *Financial Statements of Incorporated Business, Quarterly.*

It is unclear to what extent these structural changes have really become established in the stock market. What we would point out to policy makers, however, is that changes are taking place. Hence, when they attempt to use share prices as an information variable, past experiences with the market may not always be reliable.

Figure 13

Changes in investment yardsticks (a new emphasis on ROE)

Contrasts in share price movements between groups of rising and falling ROE



Notes: We classified the 30 industries (excluding banking, insurance, securities) into two groups, based on rising or falling ROE. We averaged share prices of each groups to compare with the average of all industries, and looked at the contrast between share prices in rising and falling ROE by plotting share prices of each groups from 12 months before the publication of ROE. We selected 1984 (FY) and 1996 (FY) as samples because there were roughly equal number of industries in each grouping. 1984: rising = 20 industries, falling = 10 industries; 1996: rising = 19 industries, falling = 11 industries.

Sources: Tokyo Stock Exchange; Nihon Keizai Shimbun, Inc., *NEEDS (Nikkei Economic Electronic Databank System)*.

Conclusion

This paper has so far verified the usefulness of share prices as information variables for policy makers and discussed the distinguishing characteristics of Japanese share price formation and the factors behind the slump of the nineties, particularly the role played by land prices. We have also touched on what appears to be signs of structural changes within the stock market during the nineties, emphasising the unwinding of crossholding relationships.

During the past year, the Nikkei average dropped from a high of 21,556 points[21] at the end of September 1996. During the January-March 1997 period it was hovering in the 17,000-18,000 point range. It later recovered to about 20,000 points during the May-July period, but has been slack since August. As of this writing in mid-September it was in the mid-17,000 point range. The major factors pushing share prices down during this period were uncertainties over the economic outlook caused by the fiscal austerity programme and a spate of corporate bankruptcies emerging in the

[21] This represents nearly a peak for post-bubble share prices. The Nikkei bottomed at 14,309 points in August 1992. Subsequent annual averages have been 19,100 for 1993, 19,935 for 1994, 17,329 for 1995, and 21,088 for 1996.

aftermath of the bubble. The low yield spread would indicate that there is little room for considering Japanese shares to be overvalued at current levels, but that does not mean the uncertainties over share prices will be resolved any time soon. Our observations so far in this paper indicate that three things will be required before share prices are able to begin a full-fledged recovery:

1) Recovery in the expected macroeconomic growth rate;

2) relief from the high credit risks brought by falling land prices – a cleanup of the negative legacies from the bubble;[22] and

(3) corporate behaviour emphasising shareholders values, such as the revision of dividend policies and improvement of return on equity (for example, by buying back shares from the market).[23]

Additionally, steps should be taken to introduce market valuation of assets and enhance disclosure requirements. During the boom and bust of the bubble, there were vast differences between the book values of assets on corporate accounts and their actual market values, and this made it difficult for investors to understand the assets and financial position of the companies they were investing in, increasing the opaqueness of investments. Other than these changes in corporate accounting, Japan also needs to improve its market infrastructure, for example, by establishing market practices that are both fair and transparent, reconsidering its securities taxation, and using deregulation to promote competition in the financial services sector. These realisations have inspired the government to move forward with a series of financial reforms, dubbed the "Japanese Big Bang". There are also structural reform plans for areas other than finance, and if the markets agree that the reforms will be effective, the consequent recovery in the expected growth rate should eventually be reflected in share prices.

---

[22] Recent land price movements in urban areas indicate that considerable progress has been made at the macro-level in terms of the corrections required by the rupture of the bubble. Residential land appears to have stopped falling and commercial land prices are polarising between levels which are holding steady and levels which continue to drop, depending on the land's profitability. Overall, therefore, the rate of decline is contracting (of course, there are large differences among individual companies, including financial institutions, in the extent to which they have corrected their balance sheets).

[23] Until now, companies have rarely bought back their shares because of the "assumed dividends tax". This system was frozen in 1995, albeit only for three years and this combined with amendments to the Commercial Code in 1994 to cause a gradual increase in share buybacks. The amendments allow companies to buy their own shares if their shareholders agree to a profit write-off or if shares are needed to provide employees with stock options. Since 1995, sixty-three listed companies (Tokyo, Osaka, Nagoya) have bought back shares or have announced their intention to do so (as of 13th September 1997).

Appendix A: Correction for crossholding factors

The price/earnings ratio for the market as a whole is found by dividing market capitalisation by total earnings. The price/earnings ratio corrected for crossholding factors deducts cross-held shares from both market capitalisation and total earnings.

$$Adjusted\ market\ capitalisation = Apparent\ market\ capitalisation \times (1 - Crossholding\ ratio)$$

$$\begin{aligned} Adjusted\ total\ earnings &= Apparent\ total\ earnings - Total\ dividends\ receivable\ from\ crossheld\ shares \\ &= Apparent\ total\ earnings - (Total\ dividends \times Crossholding\ ratio) \\ &= Apparent\ total\ earnings - (Apparent\ total\ earnings \times Payout\ ratio \times Crossholding\ ratio) \\ &= Apparent\ total\ earnings \times (1 - Payout\ ratio \times Crossholding\ ratio) \end{aligned}$$

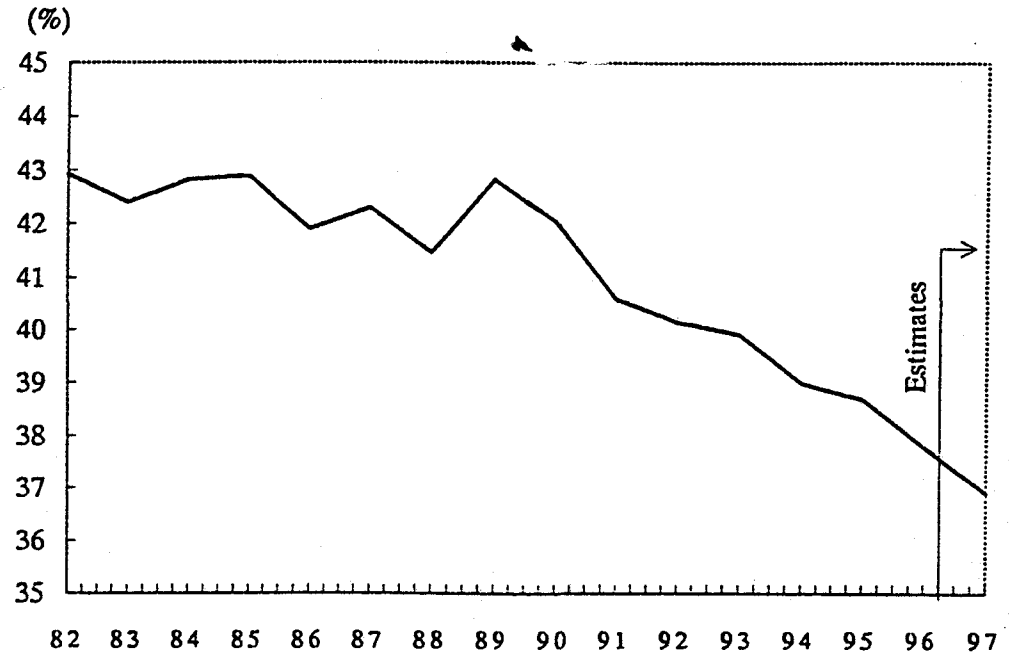
$$Adjusted\ price\ earnings\ ratio = \frac{Adjusted\ market\ capitalisation}{Adjusted\ total\ earnings}$$

$$= \frac{Apparent\ market\ capitalisation \times (1 - Crossholding\ ratio)}{Apparent\ total\ earnings \times (1 - Payout\ ratio \times Crossholding\ ratio)}$$

$$= \frac{1 - Crossholding\ ratio}{1 - Crossholding\ ratio \times Payout\ ratio} \times Apparent\ price\ earnings\ ratio$$

(Estimates by Daiwa Research Institute used for the crossholding ratio.)

Share crossholding ratio



Notes: Crossholding ratio of listed companies = Ordinary bank shareholding ratio + Trust bank shareholding ratio + Casualty insurance company shareholding ratio + Securities company shareholding ratio - Investment trust shareholding ratio - Pension trust shareholding ratio - Public fund shareholding ratio - Tokkin and fund trust shareholding ratio + Other corporate shareholding ratio * 0.7.

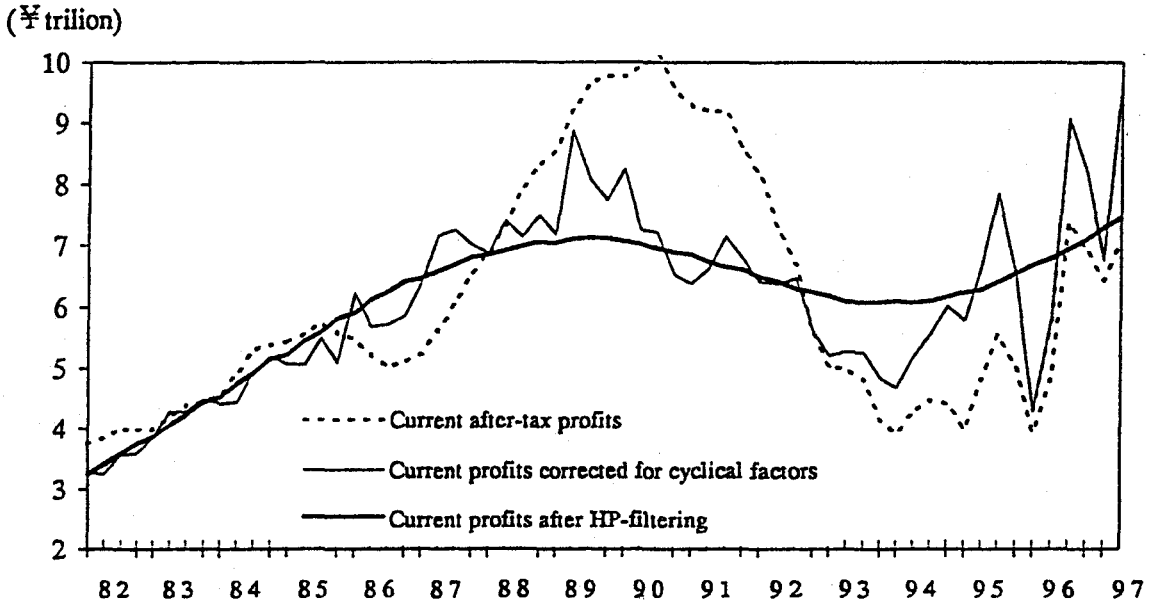
Estimates for the second quarter 1996 and beyond assume that unwinding proceeded at the same pace as during the 1995-96 fiscal years. First quarter figures for each year are from Daiwa Research Institute (other quarterly figures were as indicated by the graph lines).

Appendix B: Correction for cyclical factors

Short-term corporate earnings will undergo large swings because of business cycles, and the earnings that the markets use to forecast the future stream of corporate earnings are based on the assumption that the expected growth rate of nominal earnings is constant, and may differ from actual earnings. In other words, if the economy is currently in recession but corporate earning are forecast to recover in the future, then the price/earnings ratio will be upward biased, while if the economy is currently in a boom but corporate earnings are forecast to decline, the opposite will be true. Therefore, when assessing price/earnings ratios, it is necessary to eliminate these cyclical factors from calculations of corporate earnings.

There are many techniques that could be used to correct for cyclical factors. The technique we have used is to take the residual from a regression of forecast earnings on the GDP gap (estimated), and to assume that there is a trend after elimination of cyclical factors. We then use the residual from the previous calculation and substitute the average gap value during the estimation period for the gap effect, thereby arriving at a forecast earnings trend corrected for cyclical factors. To this we apply an HP filter (l = 1,600) to smooth out the curve and eliminate noise. These values have been used in this paper as "corporate earnings corrected for cyclical factors".

Correction of corporate earnings for cyclical factors



Estimation formulas:

(1) *LN* ((Current after-tax profits (real)) = 16.04 + 0.12 x *GDP gap*
(221.3) (6.5) ( ) = t-value

Estimation period = 1982Q1–1997Q1

Adjusted R-square = 0.404 S.E. = 0.226 D.W. = 0.340

(2) *Current after-tax profits* (real; corrected for cyclical factors)

= EXP (16.04 + 0.12 x *Average value for GDP gap during the estimation period*) +ε, where ε is the residual from Equation (1).

(3) An HP-filter (l = 1,600) is applied to the values from Equation (2), and the results deemed current after-tax corporate profits corrected for cyclical factors.

Notes: The seasonally adjusted GDP deflator was used to compute real values. The graph shows nominal current after-tax profits.