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Discussion Paper No. 2003-E-15

IMES

INSTITUTE FOR MONETARY AND ECONOMIC STUDIES

BANK OF JAPAN

C.P.O BOX 203 TOKYO
100-8630 JAPAN

IMES Discussion Paper Series 2003-E-15

December 2003

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Abstract

This paper reviews the implications of asset price fluctuations on financial and macroeconomic stability, based on Japan's experience of the asset price bubble. Japan's experience of asset price bubble is characterized by euphoria, that is, excessively optimistic expectations with respect to future economic fundamentals, which lasted for several years and then burst. Under such circumstances, policymakers are unlikely to take an appropriate policy response without evaluating whether asset price hikes are euphoric or not, and forecast a correct path for the potential growth rate. In so doing, it is deemed important to assess the sustainability of financial and macroeconomic stability.

Keywords: Asset price bubble; Financial stability; Macroeconomic stability, Sustainability.

JEL Classification Codes: E31, E44, E58, E63, G18

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This paper is prepared for the IMF/BIS Conference on Real Estate Indicators and Financial Stability, held at IMF Headquarters in Washington, D.C. during October 27–28, 2003. This paper is based on my past research with many co-authors, including Kunio Okina, Makoto Saito, Tokiko Shimizu, and Masaaki Shirakawa. I would like to thank the staff of the Institute for Monetary and Economic Studies of the Bank of Japan for their helpful comments. The views expressed here are mine and do not necessarily reflect the official views of either the Bank of Japan or the Institute for Monetary and Economic Studies.

I. Introduction

In this paper I discuss implications of asset price fluctuations for financial and economic stability, based on Japan's experience in the late 1980s.

A look back over Japan's experience since the late 1980s shows that the emergence and bursting of the bubble played an important role in economic fluctuations in this period. This experience clearly indicates that both financial and macroeconomic instability is closely related to large fluctuations in asset prices, and raises the question of what is the appropriate way to treat asset prices in macroeconomic policymaking.

What should be noted regarding Japan's experience is that enthusiasm of market participants, not consistent projection of fundamentals, contributed largely to maintaining temporarily high asset prices at that time. Such enthusiasm is often called euphoria,[1] which excessively optimistic but unfounded expectations for the long-term economic performance last for several years and then burst.[2]

In this context, it is crucial to accurately analyze what asset price fluctuations imply and to accurately evaluate how expectations illustrated in such fluctuations are sustainable. In retrospect, prevailing expectations during Japan's late 1980s was that Japan was entering a new era of economic development corresponded to optimistic expectations for potential growth. It was thus excessive optimism rather than consistent projection of fundamentals that mainly supported temporarily high asset prices. As a result, increase in asset prices during this period failed to deliver a sufficient clue to assess whether such increase was consequence of an advent of a new economy or just euphoria.

This paper is organized as follows. Section II summarizes the characteristics of the asset price bubble in the late 1980s with reviewing Japan's experience of asset price booms in the postwar period. Section III verifies the lessons of asset price bubbles regarding financial and macroeconomic stability. Section IV discusses policy

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1 Kindleberger (1996) employs the concept of euphoria to describe financial history of major asset price bubbles. Shiller (2000) uses a term of "irrational exuberance" to describe similar phenomenon. Garber (2000), however, offers a negative view against the explanation of bubbles from the viewpoint of mass psychology.

2 It is important to note that euphoria is completely different from a rational bubble as modeled in Blanchard and Watson (1982). The rational bubble is expressed as a divergence from economic fundamentals and the probability of its bursting is recognized among economic agents and thus incorporated into asset price formation.

implications regarding how to deal with major fluctuations in asset prices in macroeconomic policymaking. Section V examines policy implications in a more practical manner by conducting a case study exercise based on Japan's macroeconomic conditions in the late 1980s. Section VI offers concluding discussion.

II Japan's Asset Price Bubble since the Late 1980s

In this section I summarize the characteristics of asset price bubbles in the late 1980s, based on Japan's historical experience of asset price inflation in the postwar period.

A. Japan's Asset Price Fluctuations in the Post-WWII Period

Figure 1 plots major financial and economic indicators, including asset prices such as stock and land prices in the postwar period. The figure plots stock prices and land prices as indicators for asset prices (upper panel), the consumer price index, the domestic wholesale price index, and the GDP deflator as indicators of the general price level (second upper panel), the growth rate of real GDP, and the unemployment rate as indicators for demand-supply conditions (second lower panel), and M2+CDs and nominal GDP (lower panel).

The figure shows Japan experienced three major boom-bust cycles in asset prices in the postwar period: (1) the *Iwato* boom in the second half of the 1950s; (2) the boom of Prime Minister Tanaka's 'remodeling the Japanese archipelago' project; and (3) the *Heisei* boom in the late 1980s to early 1990s.

First, at the time of the *Iwato* boom, when Japan's economy entered the so-called 'high-economic growth period,' asset prices increased rapidly, reflecting an improvement in fundamentals due to technological innovation. The real economic growth rate exceeded 10 percent per annum, driven mainly by investment demand due to technological innovation that replaced the post World War II reconstruction demand. On the price front, consumer prices rose while wholesale prices remained generally stable, thus leading to the so-called 'productivity difference inflation.'

Second, during the period from the 'remodeling the Japanese archipelago'[3] boom to the first oil crisis, asset prices first increased and then the general price level

[3] Kakuei Tanaka, who became Prime Minister in 1972, effected extremely aggressive public investment based on his belief (remodeling the Japanese archipelago) that it was necessary to resolve overpopulation and depopulation problems by constructing a nationwide *shinkansen* railroad network, which led to an overheated economy.

sharply rose due to the excessively high growth of money stock and oil price hikes stemming from the first oil crisis. In the mean time, real economic growth rapidly declined marking an end to the high economic growth period.

Third, in the *Heisei* boom, asset prices increased dramatically under long-lasting economic growth and stable inflation. Okina, Shirakawa, and Shiratsuka (2000) define the 'bubble period' as the period from 1987 to 1990, from the viewpoint of coexistence of three factors of the bubble economy, that is, a marked increase in asset prices, an expansion of monetary aggregates and credit, and an over-heating of economic activity. The phenomena particular to this period were stable CPI inflation parallel with the expansion of asset prices and long adjustment period after the peaking of asset prices.

The decline in asset prices was initially regarded as the bursting of asset price bubble, and the amplifying factor of a business cycle. Although the importance of cyclical aspects cannot be denied, further declines in asset prices after the mid-1990s seem to reflect the downward shift in trend growth rate beyond the boom-and-bust cycle of the asset price bubble (Figure 2).[4]

B. Mechanism behind the Emergence and Expansion of the Bubble

Focusing on the third episode above, the bubble was generated by the complex interaction of various factors as a process of 'intensified bullish expectations' (Figure 3).

The intensified bullish expectations are clearly observed in the increased equity yield spread during the period form the late 1980s to the early 1990s (Figure 4). As reported by Okina, Shirakawa, and Shiratsuka (2000), the expected growth rate of nominal GDP computed from the equity yield spread in 1990 is as high as 8 percentage points with the standard assumption based on the discount factor. However, in view of the low inflation at the time, it is almost impossible to believe that the potential growth rate of nominal GDP was close to 8%. Hence, it would be more natural to infer that the high level of the yield spread in 1990 reflected the intensification of bullish expectations, which are unsustainable in the long run.

The intensified bullish expectations were surely grounded in several factors

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[4] The bursting of the asset price bubble not only triggered the materialization of adverse effects but also amplified them as time passed, thereby making such structural adjustment more difficult. This incomplete economic adjustment to major changes in a relative price system resulted in the downward shift in a growth trend in the 1990s, thereby amplifying asset price decline beyond the boom-and-bust cycle.

intertwined with each other. The factors below are often pointed out as behind the emergence and expansion of the bubble:

- Aggressive behavior of financial institutions
- Progress of financial deregulation
- Inadequate risk management on the part of financial institutions
- Introduction of the capital accord
- Protracted monetary easing
- Taxation and regulations biased toward accelerating the rise in land prices
- Overconfidence and euphoria
- Over-concentration of economic functions on Tokyo, and Tokyo becoming an international financial center

Focusing on monetary factors, it is important to note that widespread market expectations that the then low interest rates would continue for an extended period, in spite of clear signs of economic expansion. The movement of implied forward rates from 1987 through 1989 (Figure 5) shows that the yield curve flattened while the official discount rate was maintained at a low level.[5]

III. Adverse Effects on Financial and Macroeconomic Stability

In this section, I selectively examine lessons of Japan's asset price bubbles in terms of financial and monetary stability. I take up three points below: (i) build-up of risks during the period of bubble expansion; (ii) vulnerability of the bank-based financial system; and (iii) weakened effects of monetary easing.

A. Build-up of Risks during the Period of Bubble Expansion

The first lesson is that risks of financial and macroeconomic instability are built up during asset price booms and such risks are materialized as an aftermath of asset price declines and recessions.[6] In light of Japan's experience, it seems to be a characteristic

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5 The implied forward rate is the future interest rate estimated from market rates with a different time-to-maturity. For example, the implied forward rate for three years ahead gradually increased from June 1987. As the BOJ conducted a slightly tighter monetary operation from September 1987, it rose to a level over 6% in the fall. However, such expectations for higher interest rates receded after the worldwide plunge of stock prices in October of the same year, and the implied forward rate decreased to around 5%. After the spring of 1988, the stock market gradually recovered and the economy once again showed clear signs of expansion. Nevertheless, the rate basically remained flat at around 5% toward the spring of 1989.

6 Borio, Furfine, and Lowe (2001) for further discussion on this point.

that effects of a bubble are asymmetrically larger in the bursting period than in the expansion period.

A rise and fall in asset prices, which contain an element of a bubble, influence real economic activity mainly through two routes: (i) on consumption through the wealth effect, and (ii) on investment through a change in external finance premium due to changes in collateral and net asset values.[7] As far as asset prices are rising, they influence the economy in a favorable way and the adverse effects are not thoroughly recognized.

However, once the economy enters a downturn, the above favorable cycle reverses, thereby leading to a severe reaction. The harmful effects of a bubble will emerge, exerting stress on the real side of the economy and financial system due to an unexpected correction of asset prices. If intensified bullish expectations which previously supported the bubble are left unchecked, expansion and subsequent bursting of the bubble will become bigger, affecting the real economy directly or, by damaging the financial system, indirectly.

Looking at the land price problem from the viewpoint of the stability of the financial system, it was the risk brought about by the sharp rise in land prices and the concentration of credit in the real estate and related industries that were insufficiently perceived. During the bubble period, real estate was generally accepted as collateral. However, if the profitability of businesses financed by secured loans is closely related to collateral value, such loans become practically unsecured since profits and collateral value move in the same direction.

In fact, Shimizu and Shiratsuka (2000) show a simple numerical exercise, based on an analytical framework of value at risk (VaR), enables us to sufficiently predict the magnitude of non-performing loans held by Japanese banks in the 1990s ('stress testing'). The exercise estimates the aggregate credit risk inherent in the loan portfolio of Japanese banks during the bubble period by assuming sufficiently prudent scenarios for the probability of bankruptcy, the concentration of credit and the future fluctuation of collateral prices (see Figure 10 for the scenario for land price fluctuation, and Table 1 for the estimation results).[8]

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[7] Bernanke, Gertler and Gilchrist (1996) refer to the amplification mechanism of initial shocks through changes in credit market conditions as the 'financial accelerator.'

[8] It should be noted that the analytical framework of Shimizu and Shiratsuka (2000) focuses on the

It should be noted, in this context, that the interaction of risks takes various forms, and such aggregate risks are not merely the simple sum of risks recognized by individual economic agents. It might well be the case that an insufficient recognition of the interaction of various risks in the economy leads to an excessive concentration of risk. It is thus deemed important to recognize the risk profile of the economy as a whole, which might adversely affect sound financial and economic conditions from the medium- to long-term viewpoint.

Moreover, the effect of asset price fluctuations is asymmetric, with a stronger effect in the case of an asset price decline, because the collapse in asset prices has adverse effects on the stability of the financial system. Changes in cash flow and asset prices arise from cyclical movements in firms' net worth, affecting agency costs and thus credit conditions, and then affect firms' investment behavior. It is important to note that the capital base functions as a buffer against future risks and losses. Although this function is not clearly recognized as long as the economy is expanding smoothly, the adverse effects of having an insufficient capital base will materialize once the outlook for economic expansion changes.

B. Vulnerability of a Bank-based Financial System

The second lesson is that the vulnerability of Japan's banking system against very large and unexpected shocks increased significantly in the late 1980s.[9]

In a financial system, banks play a buffer role against short-term shocks by accumulating internal reserves when the economy is sound while absorbing losses stemming from firms' poor business performance or bankruptcy during recession. Even though some risks cannot be diversified only at a particular point in time, such risks can nevertheless be diversified over time. However, in order to achieve a more efficient allocation of risks in the economy, one needs not just markets for cross-sectional risk sharing but a sufficient accumulation of reserves as a buffer for intertemporal risk smoothing.

Such a risk smoothing function of the banking sector, however, is difficult to maintain under financial liberalization and more intense competition from financial

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changes in collateral values of bank loans, among various risk factors for bank loan portfolios. This approach is thus effective in the case of Japan in the late 1980s, whose financial system heavily depended on bank lending secured by real estate. Financial systems vary between countries in terms of the relative weights of bank lending and other features.

9 Baba and Hisada (2001) discuss the characteristics of Japan's financial system in detail.

markets. Intertemporal smoothing requires that investors accept lower returns than the market offers in some periods in order to get higher returns in others. Investors, however, would opt out of the banking system and invest in the financial markets, thereby deteriorating banks' internal reserves. As a result, a risk smoothing function is more easily and suddenly lost than before, once the economy encounters a shock that erodes banks' net capital to the extent it threatens their soundness.

In fact, during the bubble era, gradual financial deregulation led to undermining the profitability of the banking sector in Japan (Figure 6), thereby deteriorating the risk smoothing function in the banking sector. Against the background of financial liberalization, fund-raising by major firms had been rapidly liberalized since around 1980, while banks were only allowed to enter the securities business gradually. Thus banks were very concerned that major firms would become less dependent on them for funding. In the meantime, since interest rates on deposits had gradually been liberalized, banks forwent the rent stemming from accepting deposits with regulated interest rates and were inclined to aggressively extend loans to small and medium-sized enterprises against real estate collateral as well as real estate-related loans at low interest rates (Figure 7). In retrospect, such aggressive lending at low interest rates seemed to have been pursued by financial institutions taking excessive risks compared with their profit outlook.

In this connection, two points should be also noted. First, a bank-based financial system, like Japan has, absorbs more risks from households than a market-based financial system does. Risk allocation in the economy thus should have been very different, if the economy had a market-based financial system even under a similar course of financial and economic development. Second, a bank-based financial system tends to magnify the adverse effects of the bursting of bubbles on real economic activity due to the longer time lag until their materialization.

C. Weakened Effects of Monetary Easing

The third lesson is that the effectiveness of the central bank's monetary easing is substantially counteracted when the financial system carries problems stemming from the bursting of a bubble.

Although it is difficult to give a direct answer to the above question, the quantitative growth of financial indicators suggest that the current monetary easing phase is different and unusual compared with past easing phases. First, on a

quantitative aspect, Figure 8 shows monetary base (which are the liabilities of the BOJ) has been showing marked growth, money supply (M2+CDs) has been growing at a low rate and bank loans have been declining. Second, on fund allocation front, Figure 9 indicates that while loans to manufacturing industries, which are believed to carry relatively high profitability, had declined throughout the 1990s, loans to the real estate industry followed an increasing trend until 1998.

The above observation suggests the possibility of two mechanisms. First, an increase in non-performing loans erodes the net capital of financial institutions, resulting in a decline in risk-taking ability (credit crunch). Second, even though firms become unprofitable, financial institutions continue lending to them to prevent losses from materializing (forbearance lending).[10] Under such circumstances, loans to unprofitable firms become fixed and funds are not channeled to growing firms, holding down economic activity.

Moreover, monetary easing alone was unable to offset amplified shocks beyond the boom-bust cycle of asset price fluctuations. Nagahata and Sekine (2002) showed that the positive impacts of lowering interest rates worked, although such easing impacts were offset by the negative impacts of deteriorated balance sheet conditions at the firms as well as banks.

As a related issue, it should be stressed that, once a financial system tumbles into a critical situation, the boundary between monetary and prudential policies becomes extremely ambiguous.[11] Money market operations under financial crises have a larger burden of liquidity management in various markets, in addition to a standard role as a starting point of monetary policy transmission.

More precisely, during financial crises, financially stressed banks tend to have serious difficulties not only with lending, but also arbitraging and dealing. This hampers the transmission mechanism from the policy-targeted rate to longer-term rates, resulting in segmentation among various financial markets. Thus, it could be extremely important for a central bank to intervene in various financial markets to fix segmented markets, thereby restoring market liquidity and the proper transmission mechanism.

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10 Sekine, Kobayashi, and Saita (2003) provide empirical evidence on the possibility of forbearance lending in Japan in the 1990s.

11 See Saito and Shiratsuka (2001) for details on this point.

IV. Risk Management Perspectives

In this section, let me turn to policy implications regarding how to deal with major fluctuations in asset prices in macroeconomic policymaking. I would emphasize the importance of risk management perspectives in order to deal with the possibility of a bubble in a preemptive manner.[12]

A. Risk Assessment of the Economy

A starting point of the risk management of the economy is how to accurately assess risks with a view to the future risk of financial and macroeconomic instability. The critical point in the risk assessment is the judgment on the possibility of structural changes in the economy or entering a 'new economy.' As evidenced by the experience of Japan's bubble period, it is difficult to deny such a possibility with the contemporaneously available information under euphoric expectations. This makes it crucially difficult to identify whether the increases in asset prices being observed are really a bubble or not in the very process of the expansion of a bubble.

Policymakers under the above situation are faced with two different kinds of risk. When productivity is rising, reflecting a change in economic structure, strong monetary tightening based on the assumption that the economic structure has not changed would constrain economic growth potential. On the other hand, a continuation of monetary easing would allow asset price bubbles to expand if the perception of structural changes in the economy was mistaken.

This issue can be regarded as similar to a problem of statistical errors in the test procedure of statistical inference. A Type I error (the erroneous rejection of a hypothesis when it is true) corresponds to a case where (though a 'new economy' theory may be correct) rejecting the theory means the central bank erroneously tightens monetary conditions and suppresses economic growth potential. A type II error (failure to reject a hypothesis when it is false) corresponds to a case in which a bubble is mistaken as a transitional process to a 'new economy,' and the central bank allows inflation to ignite.

Given that one cannot accurately tell in advance which one of the two

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[12] Greenspan (2003) points out that monetary policymaking under uncertainty involves a crucial element of risk management.

statistical errors policymakers are more likely to make, it is deemed important to consider not only the probability of making an error but also the relative cost of each error. In this regard, Japan's experience suggests that making a Type II error is fatal compared with a Type I error when faced with a bubble-like phenomenon. For monetary policymaking at that time, it seemed pragmatic to flexibly adjust the degree of tightening while paying due attention to not only a Type II error but also a Type I error.

B. Sustainability of Sound Financial and Economic Environments

In assessing the risks in the economy, I should stress the importance of the viewpoint of the sustainability of sound financial and economic environments.

Taking monetary policy as an example, the relevant question in practice is how to define price stability so that it supports a sound financial and economic environment as a basis for sustainable economic growth. There seems to be a consensus that the best thing monetary policy can do to foster sustainable economic growth is to deliver predictably stable prices in the long-term. However, a consensus has yet to be gained as to how to transform such conceptual definition into a practice of monetary policy as regards the practical interpretation of price stability.

In this context, Shiratsuka (2000) classifies views regarding price stability into two: 'measured price stability' and 'sustainable price stability.' The first definition of 'measured price stability' emphasizes the importance of maintaining a specific rate of inflation measured by a specific price index at a particular point in time. This enables one to specify price stability numerically so as to set a tolerable target range for the inflation rate, such that price stability corresponds to a rate of inflation from zero to 2 percent.

The second definition of 'sustainable price stability' considers price stability to be important as a necessary condition for maximizing economic stability and efficiency.[13] In this case, price stability pursued by a central bank is not necessarily equivalent to maintaining a specific rate of inflation measured by a specific price index at a particular point in time. This is because such indicators are influenced by various

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[13] Mieno (1994), the former Governor of the BOJ, stated during his lecture at the Kisaragi-kai in May 1994 that "Price stability does not mean the stability of price indices. Real price stability can be achieved when such stability is backed by medium- to long-term, well-balanced, and sustainable economic growth."

temporary shocks and measurement errors.[14] An important yardstick for price stability is whether the stabilization of public expectations regarding inflation is attained.[15]

It seems most practically feasible for a central bank to deal with asset price bubbles from the viewpoint of contributing to the sound development of the economy through the pursuit of price stability. However, it might be the case that achieving low measured inflation in the short-term does not necessarily ensure sustainable stability of the economy.

V. Assessment of Intensified Bullish Expectations

In this section, I examine policy implications, discussed in the previous section, in more practical manner by conducting a case study exercise about the Japan's macroeconomic conditions in the late 1980s.

A. Taylor Rule

Let me first take up the Taylor rule as a possible guidepost for a central bank to deal with asset price fluctuations in a preemptive manner.

In the most basic formulation, the Taylor rule considers that the operational target level of the interest rate should be determined according to the divergence of the inflation rate and output gap from their equilibrium level (Taylor [1993]). The standard interpretation of the Taylor rule is that a central bank has two objectives on the level of economic activity, inflation and output gap, whose relative importance is evaluated by the coefficients of each objective variable. However, if we regard the output gap as a proxy of future inflationary pressure, the Taylor rule can be interpreted as a rule that responds to current and future price developments.[16]

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[14] For example, it might be the case that the statistically measured inflation is highly volatile at a glance, while most of the effects are just temporary. On the contrary, it might also be the case that measured inflation remains stable, even though the changed underlying inflation trend is offset by temporary shocks. To deal with this problem, Shiratsuka (1997) and Mio and Higo (1999) empirically show that the trimmed mean estimator, which excludes the impacts of items located on both the tails of cross-sectional distribution of inflation, adequately adjusts for the impact of temporary shocks, and could well be a quite useful and powerful indicator with which to gauge the changes in underlying inflation fluctuations.

[15] In this context, FRB Chairman Greenspan refers to price stability as being a state of the economy in which "economic agents no longer take account of the prospective change in the general price level in their economic decision making" (Greenspan [1996]).

[16] For example, Meyer (2000) states that the Taylor rule depends on tow objectives of a central bank, inflation and output gap, as well as incorporates a preemptive nature in the sense that the output gap is a leading indicator of inflation. In addition, interpreting the inflation rate and output gap as variables in

Within the framework of the Taylor rule, Bernanke and Gertler (1999) argue that it is possible for a central bank to deal with potential inflationary pressure in a preemptive manner. This is because effects of asset price fluctuations are included in changes in the current output gap.[17] They present simulation results that the BOJ should have been able to achieve better performance if it had pursued a Taylor-type rule that discards asset price fluctuations (Figure 11). In fact, their policy rule points the need for rapid tightening of raising the interest rate from 4 to 8 percent in 1988, despite of focusing only on the inflation and output gap.

Okina and Shiratsuka (2002, 2003) point out, however, that Bernanke and Gertler's (1999) conclusion depends crucially on their treatment of the consumption tax in compiling a core inflation rate (Figure 12). They show that the spike of the policy rate in 1998, observed in Bernanke and Gertler (1999), disappears when they adjust for the introduction of the consumption tax (3 percent) in April 1989. They concludes that it was difficult for the BOJ to pursuit the rapid monetary tightening in 1988 as Bernanke and Gertler pointed, if one consider that onetime price increases induced by an introduction of the consumption tax should not be offset by monetary tightening.

B. Output Gap and Trend Growth

Given the above argument on the Taylor rule, I next examine two components of the Taylor rule, output gap and inflation, in turn.

The assessment of potential GDP differed whether one adopted the optimistic expectations at the time or accepted the potential growth rate based on the benefit of hindsight that such expectations were nothing more than euphoria. In the case of euphoria, the perceived potential output path shifts upward as economic expansion prolongs, resulting in the underestimation of inflationary pressure in view of the output gap. On the contrary, in the case of a rational bubble, an output gap is assessed based on recognition that the potential output path remains unchanged. Thus, market participants correctly recognize fundamental values of asset prices as well as the sustainability of currently overvalued asset prices, which leads to the same judgement as

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the Taylor rule, Goodhart (1999) states that these two variables are core variables in forecasting future inflation.

[17] Bernanke and Gertler (1999) argue that "[by] focusing on the inflationary or deflationary pressures generated by asset price movements, a central bank can effectively responds to the toxic side effects of asset booms and busts without getting into the business of deciding what is a fundamental and what is not."

one reaches, with the benefit of hindsight, that asset price increase was totally the result of euphoria.[18]

What typically shows this point is, as illustrated in Figure 13, the evaluation of the real GDP growth path on a real-time basis. 1987/1Q is the bottom of the yen appreciation recession prior to the bubble period. At this point, when one plots a linear trend line from 1977/4Q to 1987/1Q, it approximately corresponds to a trend of 3.5-percent growth. However, from 1987/1Q to mid-1991, real GDP expanded following a trend line of 5-percent growth.

Given the above argument, it is deemed crucial that the risk of committing type II error increases, as economic expansion prolongs. This is because continued economic expansion gradually makes it difficult to recover the cyclical and trend components from the data.

C. Inflation

At the time of the bubble period, the CPI was extremely stable until around 1987, but started to rise gradually in 1988 (Figure 14). The year-on-year increase in the CPI, adjusted for the impact of consumption tax, continued to rise after April 1989, and it reached 2% in April 1990 and 3% in November 1990.

From the viewpoint of 'measured price stability,' two evaluations are possible: (1) prices eventually rose substantially toward the end of the bubble period, compared with the recent level of inflation; and (2) price stability had not been undermined in comparison with the figure before the bubble period. The difference between the two evaluations, so to speak, boils down to the question of what can be regarded as a tolerable rate of inflation. There can be a variety of answers to this question.

From the viewpoint of 'sustainable price stability,' however, it can be seen that Japan's economy experienced deflation as a result of the emergence of the bubble economy in the second half of the 1980s. Thus, as Okina, Shirakawa, and Shiratsuka (2000) point out, it could be safely claimed that Japan's economy did not succeed in maintaining price stability after the bubble period. In other words, the experience of the bubble period seems to suggest the importance of "the sustainability of price

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[18] In this context, Meyer (2000) states that a major challenge for U.S. monetary policy at that time, as of March 2000, is determining how "to allow the economy to realize the full benefits of the new possibilities while avoiding an overheated economy." He also emphasizes the importance of possible changes in aggregate supply and trend growth in the evaluation of inflationary pressure.

stability over a fairly long period."

D. Money Supply and Credit

Finally, let me examine the development of monetary aggregates. During the bubble period, the large increase in money supply and credit also signaled the need for an early increase in interest rates.

In fact, while the BOJ expressed concern over the increase in money supply from a relatively early stage,[19] such concern, however, turned out not to be taken seriously. The major reason for this was lack of a common understanding, including on the part of the BOJ, as to what kind of problems might be occasioned by the massive expansion of money supply and credit.

At that time, concern over the large increase in money supply was mainly based on the view that such an increase would eventually result in inflation. However, prices did not rise even though money supply increased. As a result, it was widely argued that the statistical relationship between money supply and prices had become unstable and this argument gradually prevailed. In addition, the on-going deregulation of deposit interest rates was often mentioned as a reason for the statistical instability.

Based on Japan's experience, when money supply and credit show a very large upswing, we should pay close attention to such movements in the conduct of monetary policy on the presumption that such large fluctuations may indicate the possibility of undesirable development in economic activity.

VI. Concluding Remarks

This paper has reviewed the implications of asset price fluctuations on financial and macroeconomic stability, based on Japan's experience of asset price bubbles in the late 1980s.

A critical point is that Japan's asset price bubble was based on excessively optimistic expectations with respect to the future, which might be described as euphoria with the benefit of hindsight, rather than a rational bubble. Under continued price stability, the perceived potential output path shifted upward as economic expansion

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19 As pointed out in Okina, Shirakawa, and Shiratsuka (2000), the BOJ had already voiced concern over the massive increase in money supply and the rapid rise in asset prices in the summer of 1986. The concern of senior BOJ officials is expressed in the term 'dry wood' (easily ignite inflation) which was often heard at the time.

prolonged, resulting in the emergence of euphoria and underestimation of inflationary pressure in view of the output gap. However, the increase in asset prices during this period also failed to deliver a sufficient clue to assess whether such increase was the consequence of the advent of a new economy or just euphoria.

After all, policymakers are unlikely to take an appropriate policy response without evaluating whether expectations for a new stage of development induced by asset price hikes are euphoric or not, and forecast a correct path for the potential growth rate. In so doing, it is deemed important to assess financial and macroeconomic stability from the viewpoints of sustainability. It should be noted, however, that no rules exist regarding how to accurately recognize the risk profiles in the economy. In fact, Kindleberger (1995) points out that there are no cookbook rules for policy judgement, and it is inevitable that policymakers are required to make a discretional judgement.[20]

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[20] Kindleberger (1995) makes comments below regarding this point: "When speculation threatens substantial rises in asset prices, with a possible collapse in asset markets later, and harm to the financial system, or if domestic conditions call for one sort of policy, and international goals another, monetary authorities confront a dilemma calling for judgment, not cookbook rules of the game."

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Table 1. The Credit Risk of the Loan Portfolio of City Banks (end of March 1990)

Unit: in trillions of yen

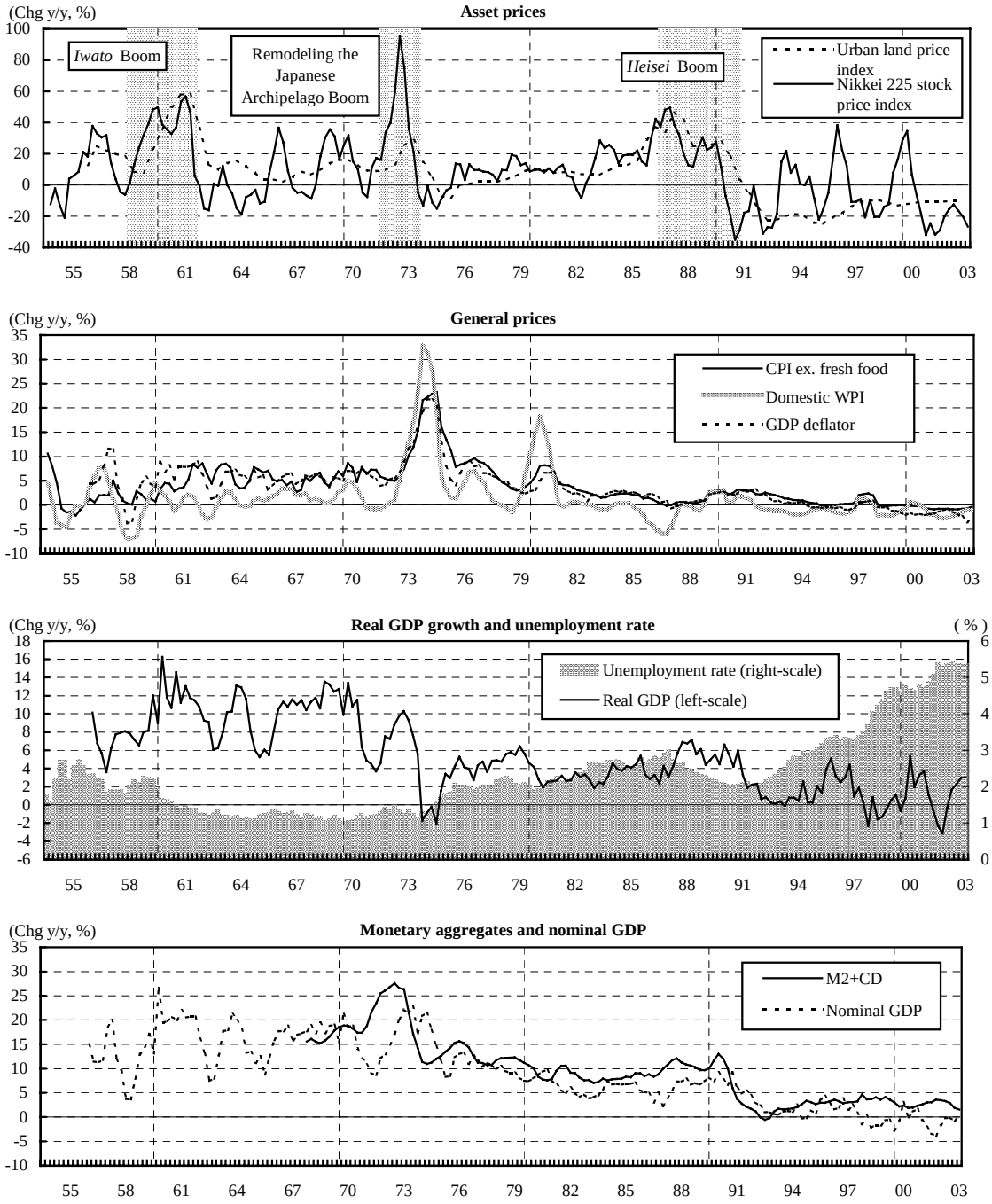
	Bankruptcy probability (observation period)	Assumption about portfolio diversification	Scenario for the future fluctuation of collateral prices	Amount of credit risk	
					of which, concentration risk
1	Bankruptcy probability ('85-89)	Average diversification	Constant	2.7	1.6
2	Default probability ('85-89)	Average diversification	Constant	5.0	2.7
3	Default probability ('90-94) assuming deterioration of the credit situation of the construction, real estate and finance-related industries	Average diversification	Constant	14.9	6.0
4	The same as above	Average diversification	Deviation from the theoretical value is eliminated in 5 years	17.5	6.9
5	The same as above	Credit concentration in the real estate and finance-related industries is assumed (α: 0.1 → 0.3)	The same as above	22.8	10.5

Source: Table 2 in Shimizu and Shiratsuka (2000).

Note: 1. "Concentration risk" refers to the amount of risk when dynamic risk is assumed to be zero.

2. In Case 3, the following increases for the default probability is assumed: for the construction industry, from 0.0 percent to 0.40 percent; for the real estate industry, from 0.0 percent to 0.59 percent; and for the finance-related industry, from 0.0 percent to 7.49 percent.

Figure 1. Asset Prices, General Prices, and Economic Environment



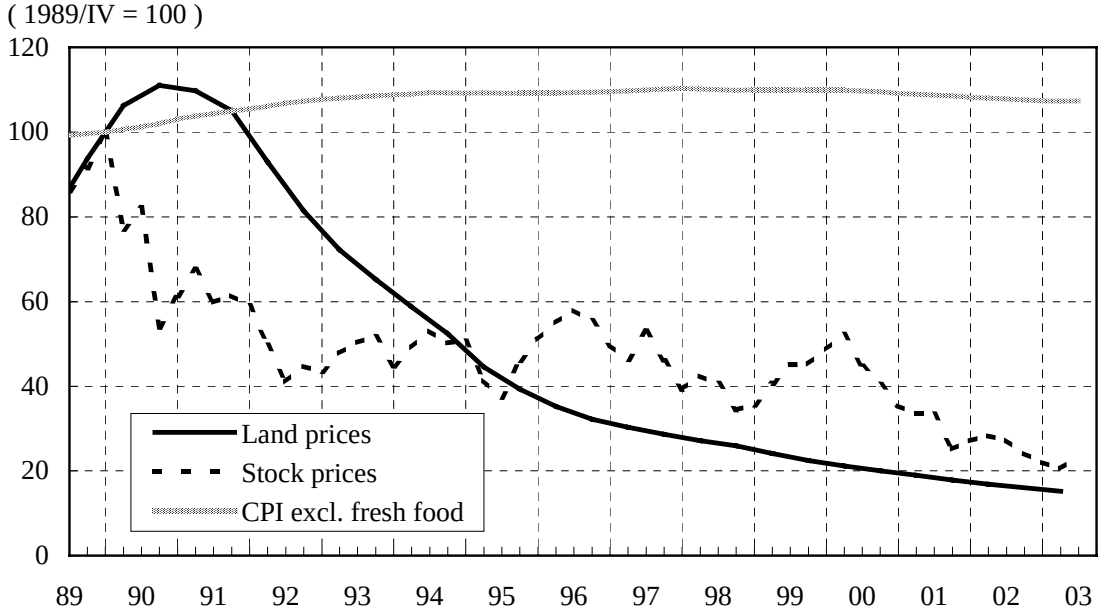
Sources: Bank of Japan, *Financial and Economic Statistics Monthly*.

Notes: 1. Urban land price index is figure for commercial land in 6 major cities.

2. Regarding CPI before 1970 and Domestic WPI before 1960, the prewar base series are connected with the current series.

3. Unemployment rate is seasonally adjusted.

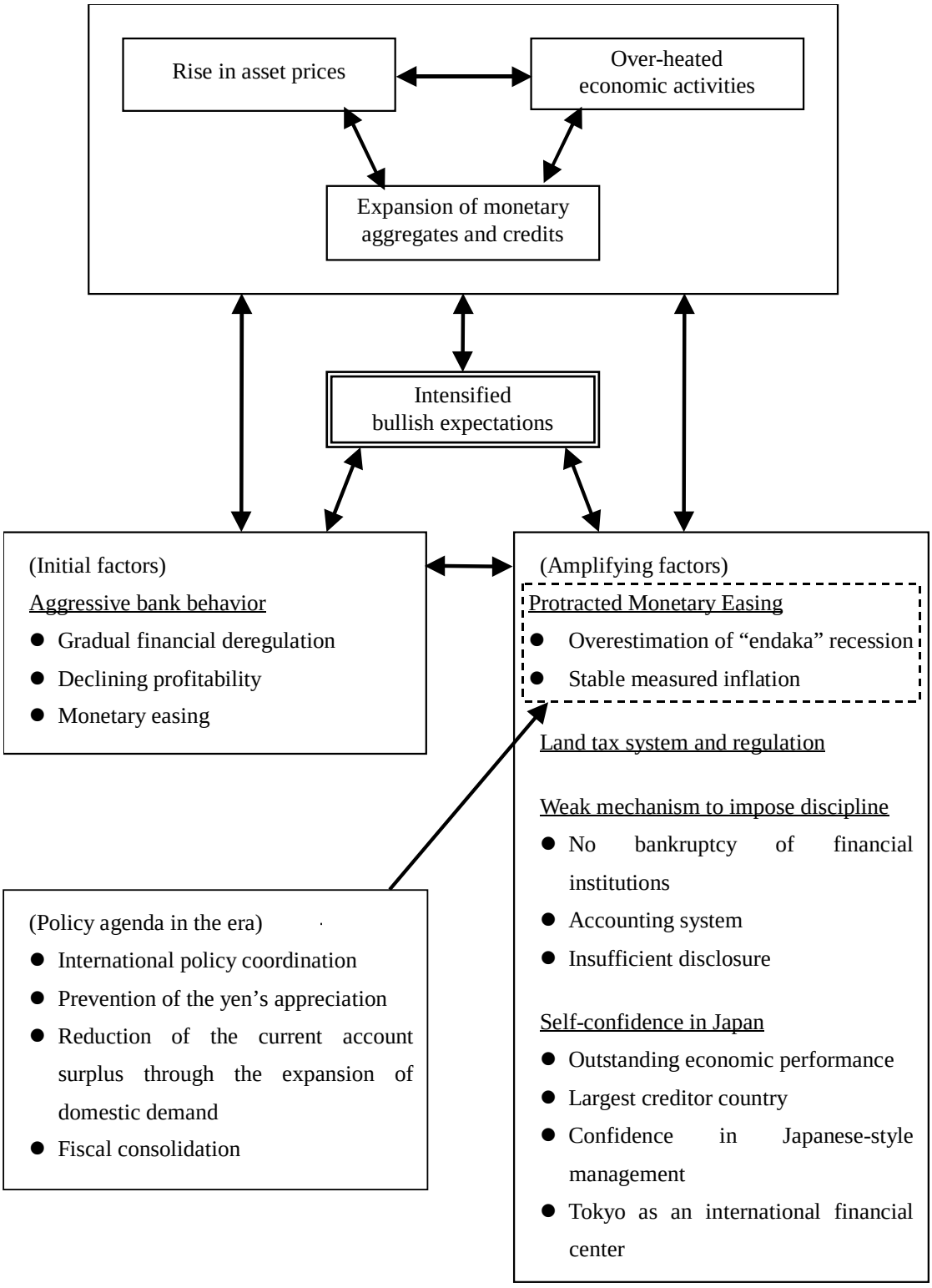
Figure 2. Asset Price Deflation



Sources: Bank of Japan, *Financial and Economic Statistics Monthly*; Ministry of Public Management, Home Affairs, Posts and Telecommunications, *Consumer Price Index*; Japan Real Estate Institute, *Urban Land Price Index*.

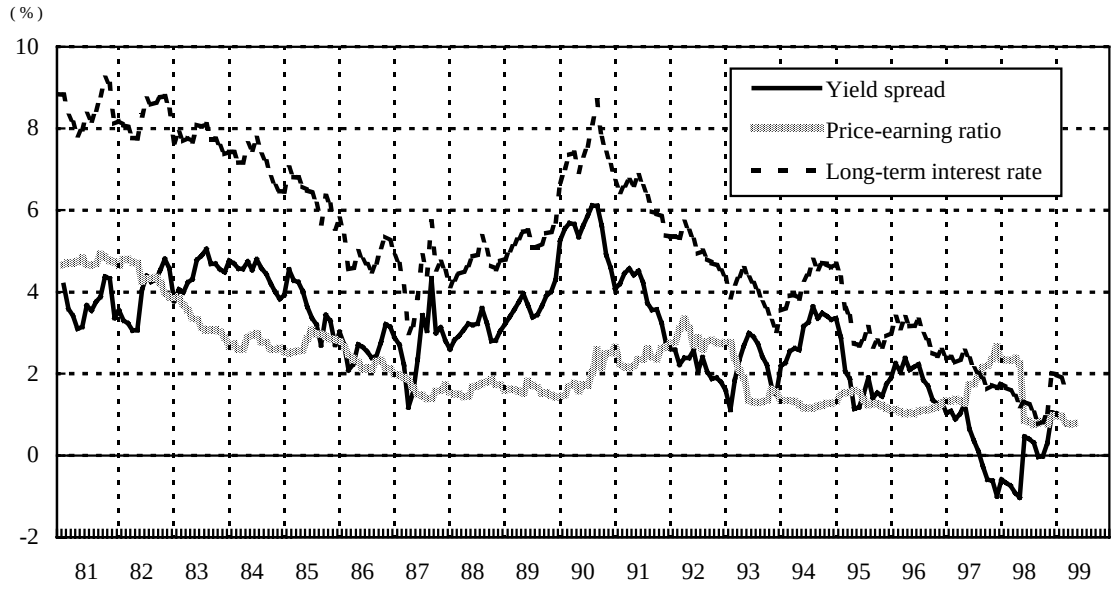
Notes: CPI excluding fresh food is seasonally adjusted by X-12-ARIMA with options of (0 1 2) (0 1 1) ARIMA model and level shifts in April 1989 and April 1997 when the consumption tax was respectively introduced and subsequently hiked.

Figure 3. Illustration of Bubble Economy in Japan



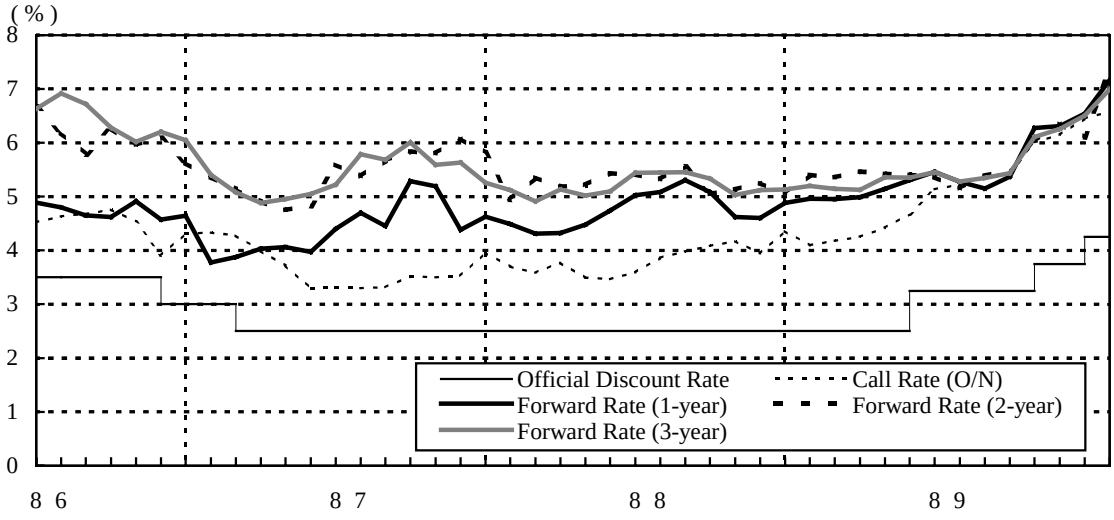
Source: Figure 13 in Okina, Shirakawa and Shiratsuka (2001).

Figure 4. Equity Yield Spreads



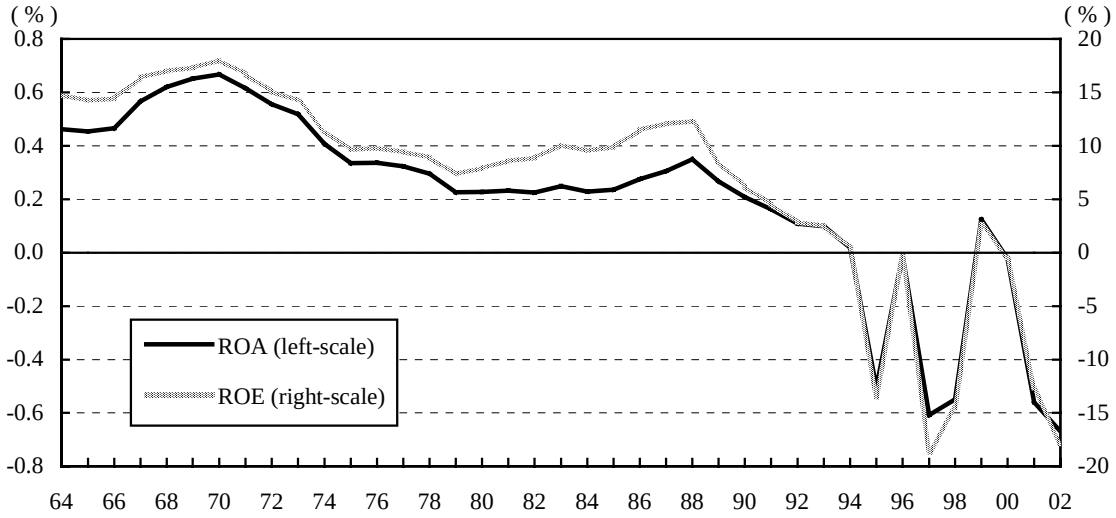
Sources: Bank of Japan, *Financial and Economic Statistics Monthly*.
Notes: 1. Yield spread and price-earnings ratio are computed on TOPIX basis.
2. Long-term interest rate is JGB (10-year) at the end of each month.

Figure 5. Implied Forward Rates



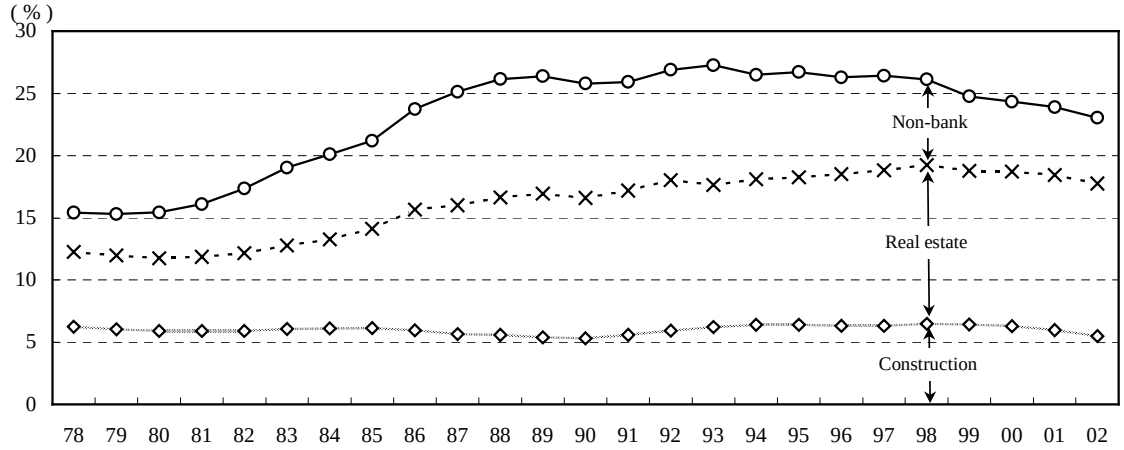
Sources: Bank of Japan, *Financial and Economic Statistics Monthly*.

Figure 6. Profitability of Japanese Banks



Sources: Japanese Bankers Association, Financial Statements of All Banks.
Notes: 1. Figures are for domestically licensed banks (summation of city banks, regional banks, regional banks II, trust banks, and long-term credit banks).
2. The definitions of ROA and ROE are as follows:
ROA = (Profit for the Term)/(Total Assets – Acceptance and Guarantees)
ROE =(Profit for the Term)/(Total Stockholders' Equity)

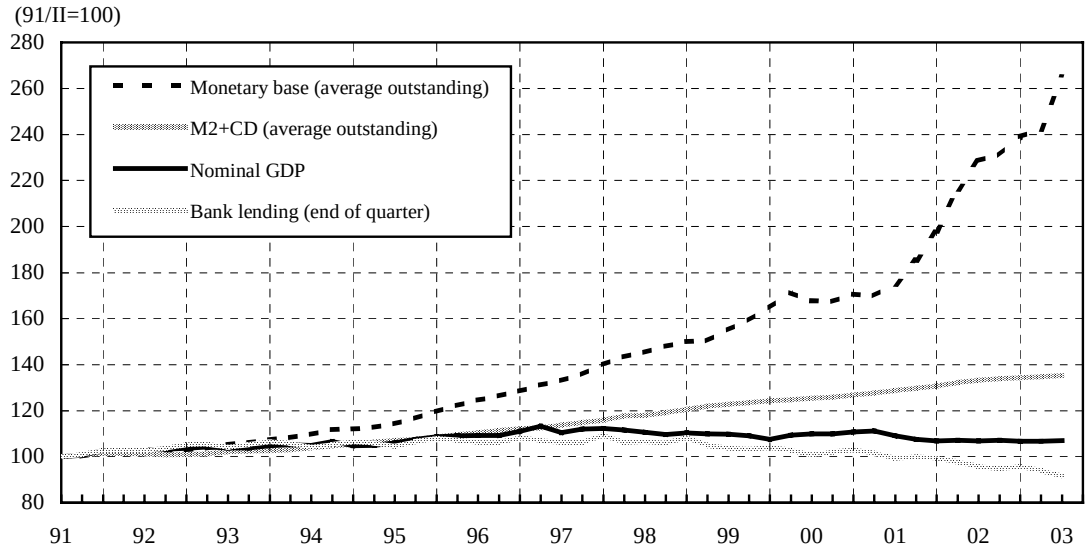
Figure 7. Bank Lending to Real-Estate Related Industries



Sources: Bank of Japan, *Financial and Economic Statistics Monthly*.

Notes: Real estate related industries correspond to real estate, construction, and non-banks.

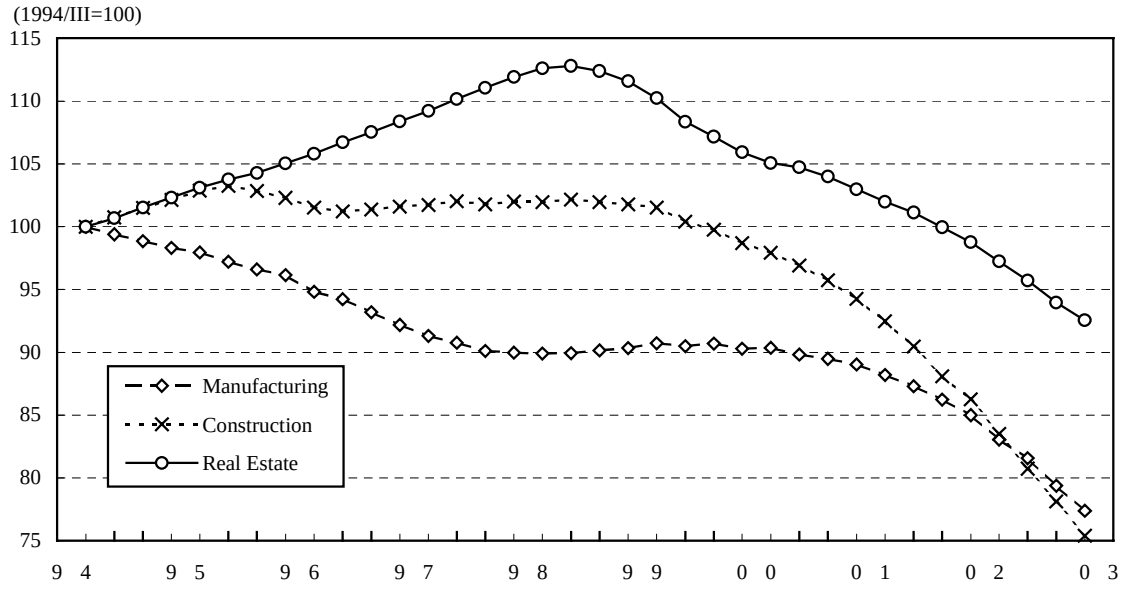
Figure 8. Monetary Aggregates



Sources: Bank of Japan, *Financial and Economic Statistics Monthly*; Cabinet Office, *Annual Report on National Accounts*.

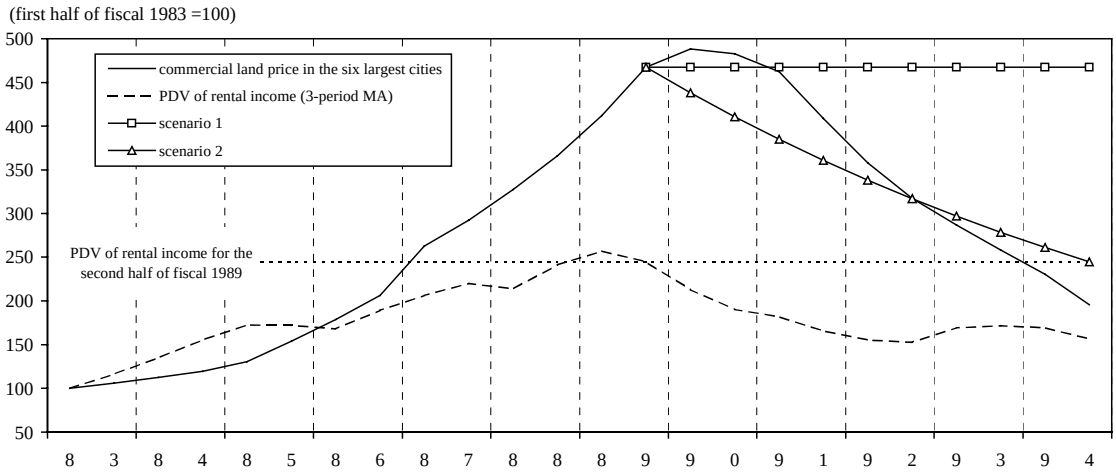
Notes: Figures for monetary base, M2+CD, and nominal GDP are seasonally adjusted. Figures for bank lending are seasonally non-adjusted.

Figure 9. Loans Outstanding by Industries



Sources: Bank of Japan, *Financial and Economic Statistics Monthly*.

Figure 10. Scenarios for Land Price Fluctuations

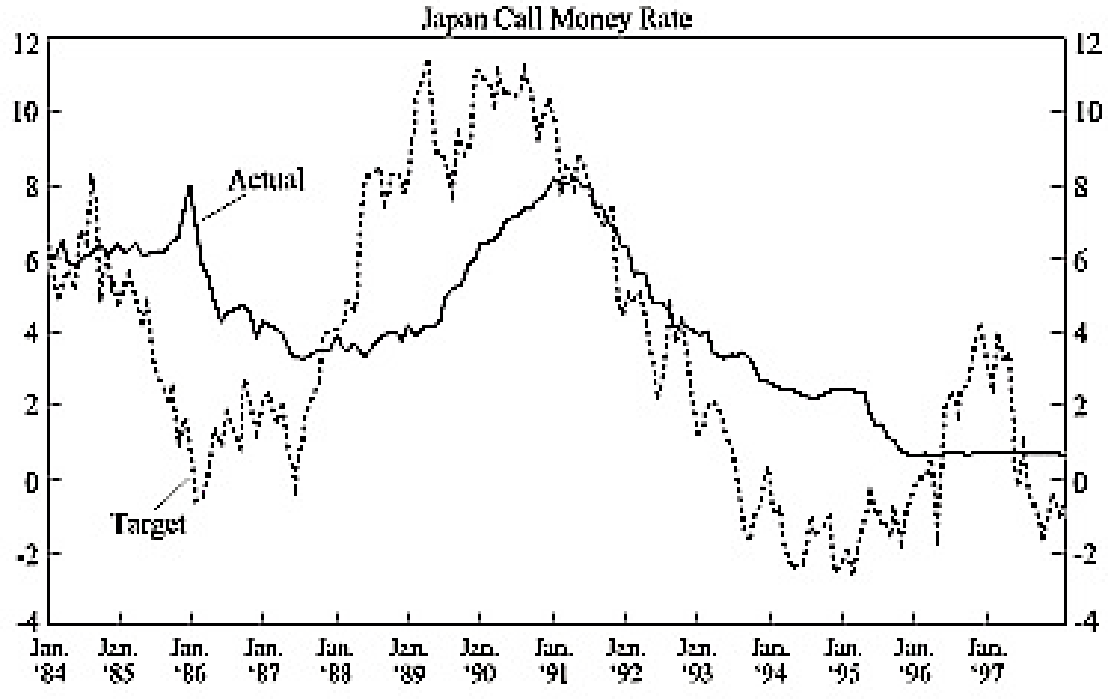


Notes: 1. It is assumed for price fluctuation after the second half of fiscal 1989 that the price will fall at a constant rate so as to eliminate the deviation from the present discounted value in 5 years.

2. The present discounted value land price is calculated by assuming that (i) total rental from office space remains constant as a percent of GDP, (ii) the rate of growth of rental income is equal to the rate of potential economic growth and the expected rate of inflation (with perfect foresight over a one-year horizon), and (iii) the risk premium is 2.3 percent (given by the difference between the rate of nominal GDP growth for fiscal 1981-1989 and the yield spread).

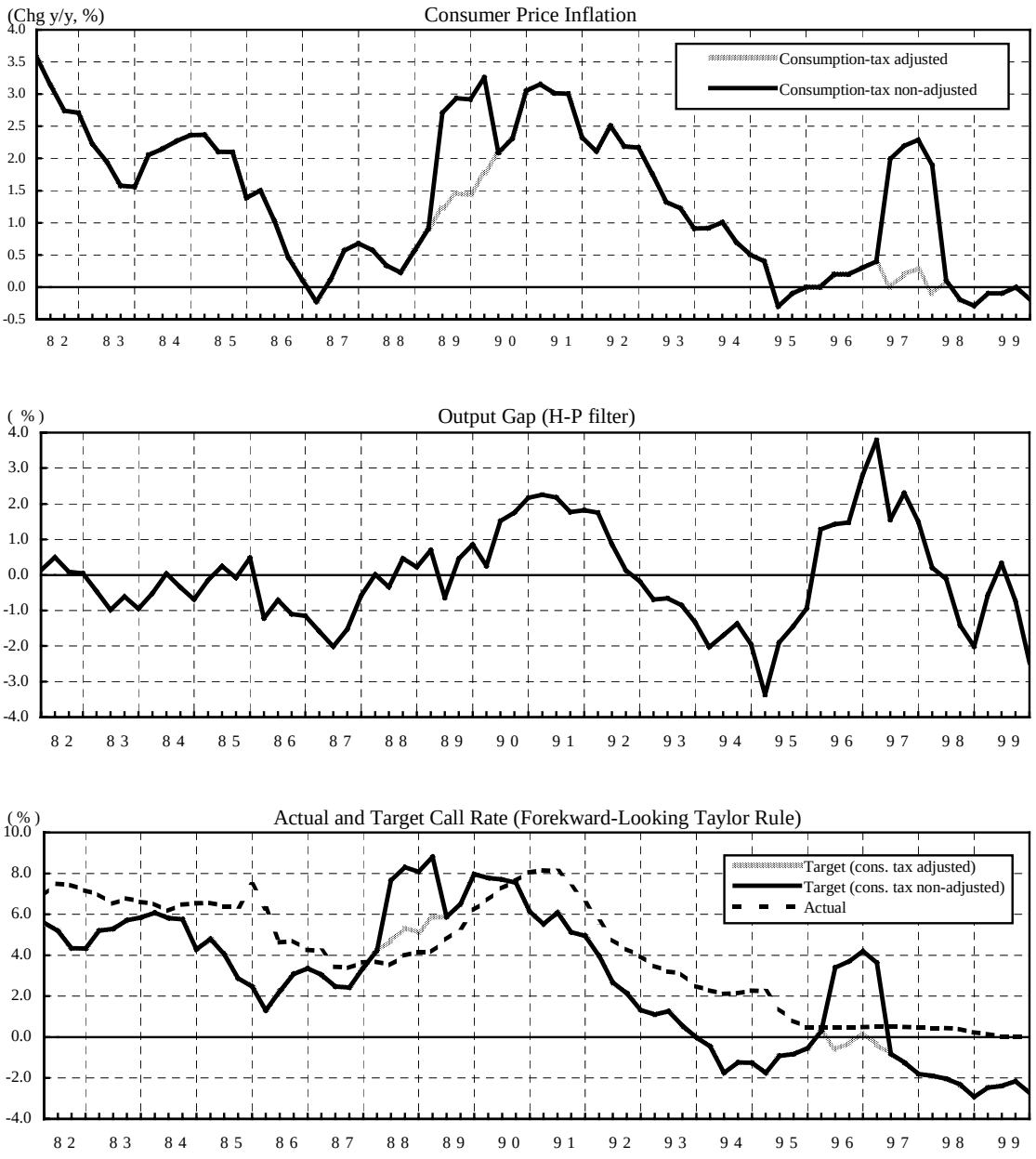
Source: Figure 1 in Shimizu and Shiratsuka (2000).

Figure 11. Taylor Rule: Bernanke=Gertler's Estimation



Source: Bernanke and Gertler (1999)

Figure 12. Taylor Rule: Okina-Shiratsuka's Estimation



Sources: Okina and Shiratsuka (2002), Charts 6 and 7.

Notes: 1. Figures for the CPI are adjusted for the impacts of consumption tax.

2. Output gaps are computed as a difference between actual and H-P filtered series for the Real GDP. H-P filtered series computed for the sample period from 1955/2Q to 2000/4Q with the smoothing parameter λ = 1,600.

3. Taylor rule is defined as $R_t = r^*_t + \pi^* + \alpha \times (\pi_{t+4} - \pi^*) + \beta \times (Yt - Y^*)$.

r^*_t: equiribrium real short-term interest rate at period t

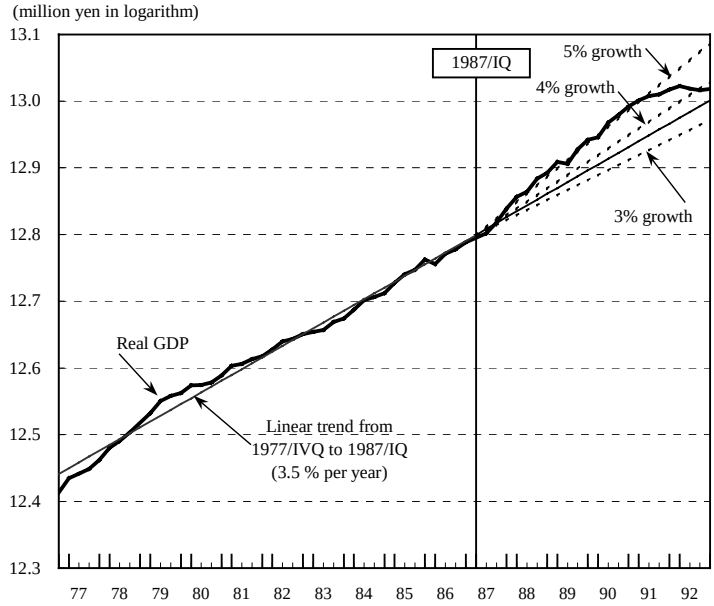
π^*: Targeted rate of inflation

R_t: Uncollateralized overnight call rate at period t

π_{t+T}: Rate of CPI inflation at period t

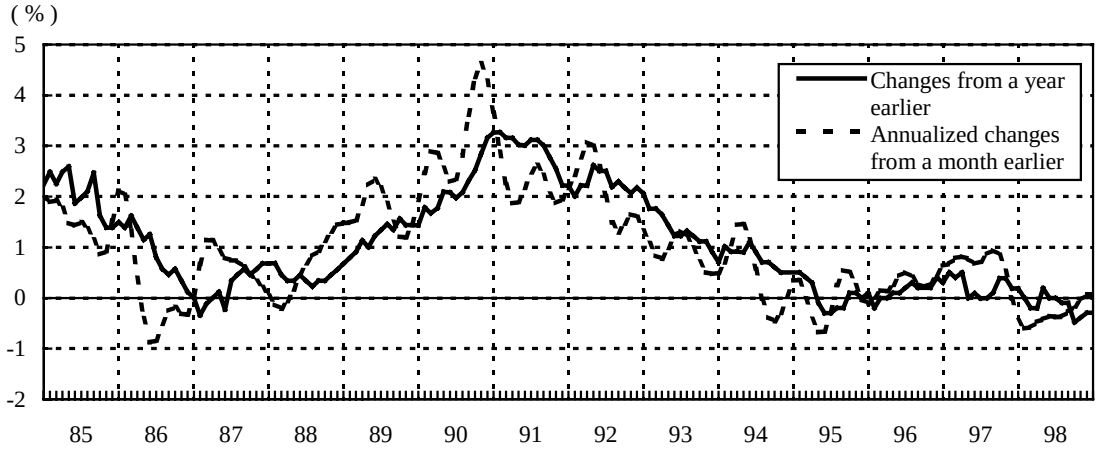
$Y_t - Y^*$: Output gap at period t

Figure 13. Impact of Trend Shift in Real GDP



Sources: Cabinet Office, *Annual Report on National Accounts*.

Figure 14. Price Development



Sources: Management and Coordination Agency, *Consumer Price Index*.

Notes: 1. Figures are adjusted for the impact of consumption tax.

2. Regarding the CPI, annualized changes from a month earlier are computed from a seasonally adjusted series applied by the X-12-ARIMA with the options as follows:

Estimation period: From January 1980 to December 1998

ARIMA Model: $(0\ 1\ 1)(0\ 1\ 1)_{12}$

Level Adjustment: April 1989 (introduction of consumption tax) and April 1997 (consumption tax hike)