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Abstract

Worldwide consensus has been established about the importance of central banks' independence and accountability in achieving price stability. However, concerning the role of central banks in prudential policy, a global standard has yet to be formed. In order to connect the two objectives, i.e., price stability and financial stability, in a mutually complementary manner, this paper focuses on the implications of asset price fluctuations for the stability of financial and economic environments. To this end, it is important to identify whether asset price fluctuations properly reflect movements in their underlying determinants, or fundamentals. This is because the misalignment of asset prices, i.e., an asset price bubble, produces serious adverse effects on the financial system and on the economy when the bubble eventually bursts. Moreover, the effect of asset price changes is asymmetric, with stronger effects in the case of an asset price decline, because the collapse in asset prices has adverse effects on the stability of the financial system. Monetary policy is required to respond to the potential risk of future asset price bubbles in a preemptive manner, based on an accurate analysis on the reasons behind the movement of asset prices. In so doing, the central bank should aim at 'sustainable price stability' that supports medium to long-term sustainable growth, not 'measured price stability' that merely maintains a specific rate of inflation measured by a specific price index at a particular point in time. Even if measured inflation is stable, a central bank needs to alter interest rates promptly once it judges that the risk of damaging 'sustainable price stability' has increased. By pursuing 'sustainable price stability,' the two objectives of central banks can be considered as complementary in the sense that one is a precondition for achieving the other. The existence of a conflict between these two objectives implies the necessity of coordination between the monetary and prudential policy functions of central banks as well as between central banks and financial supervisory and regulatory authorities.

Keywords: Asset price bubble; Sustainable price stability; Stability of financial system; Monetary policy; Prudential policy
JEL Classification Codes: E31, E44, E52, E58, G18

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I. Introduction

In this paper I examine the implications of asset price fluctuations for the conduct of monetary policy, based on Japan's experience of the emergence, expansion, and bursting of asset price bubbles, with special emphasis on the linkage between asset price fluctuations and financial stability.

Looking back at Japan's experience since the late 1980s, it is hard to deny that the emergence and bursting of the bubble played an important role in economic fluctuations in this period.[1] Although measured inflation remained stable in the late 1980s, the unfounded expectation that low interest rates would continue for a considerable period were entrenched both in the markets and in society in general, thereby exaggerating the asset price bubble by further intensifying the already bullish expectations existing in the market and in society (Okina, Shirakawa, and, Shiratsuka [2000]). After the bursting of the bubble, the resultant malfunctioning of the financial system prolonged the adjustment period, thus aggravating the negative impact on real economic activities (Mori, Shiratsuka, and Taguchi [2000]).

The above-mentioned experience clearly indicates that both financial and macroeconomic instability since the late 1980s has been closely related to large fluctuations in asset prices, and raises the question of what is the appropriate way to treat asset prices in conducting monetary policy. The prevailing consensus among economists and central bankers is that monetary policy should not target asset prices directly, but should respond to their effects on real economic activities and the general price level. However, asset price fluctuations affect not only the economic environment but also the stability of the financial system.

It is important for central banks to examine the implications of asset price fluctuations in connecting two objectives of central banks, i.e., price stability and financial stability, in a mutually complementary manner. To this end, it is necessary to identify whether asset prices fluctuations properly reflect the movements in their underlying determinants, or fundamentals. This is because the misalignment of asset prices, or an asset price bubble, produces serious adverse effects on the financial system and the economy when the bubble eventually bursts. Moreover, the effect of asset price changes is asymmetric, with stronger effects in the case of an asset price decline, because the collapse in asset prices has adverse effects on the stability of the financial system.

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[1] In addition, Borio, Kennedy, and Prowse (1994) describe the emergence of major boom-bust cycles in asset prices in a number of industrialized countries during the 1980s.

Monetary policy influences the financial system through the behavior of financial institutions and changes in macroeconomic conditions. To achieve financial system stability, however, it is important to maintain not only a favorable macroeconomic environment but also the soundness of individual financial institutions. In this regard, the regulatory and supervisory authorities play an important role. Thus, it should be noted that, although financial system stability is an important policy objective for the central bank, the central bank does not command the same power of influence over this objective as it does over price stability when trying to maintain a favorable environment.

The best thing monetary policy can do to foster sustainable economic growth is to deliver predictably stable prices in the long run. The relevant question in practice for the conduct of monetary policy is how to define price stability so that it supports a sound financial and economic environment as a basis for sustainable economic growth. 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 regard, as Shiratsuka (2000) emphasizes, a central bank should accomplish 'sustainable price stability' in the first place, and, at the same time, is also required to pursue 'measured price stability' as a quantitative yardstick by which to evaluate policy achievement from the viewpoint of accountability. Since observed changes in price indices are affected by various types of external shocks and measurement errors, it is indeed quite difficult to assess whether the underlying rate of inflation is stable or not. Therefore, even if 'measured price stability' seems to be maintained, a central bank may need to alter interest rates promptly if it judges that the maintenance of 'sustainable price stability' is at risk. Thus, in order to reconcile the two objectives, it is important for a central bank to pursue 'sustainable price stability' conducive to the sound financial and economic environment that support sustainable economic growth.

This paper is organized as follows. Section II reviews the implications of asset price fluctuations for macroeconomic performance, for example the relationship between asset prices and conventional price indexes, and asymmetric effects that entail that declines in asset prices have stronger effects on the economy than do increases in asset prices. Section III is an examination, based on the idea of a Taylor-type policy reaction function, of the possibility of a preemptive response of monetary policy to prepare against the potential effects of asset price fluctuations. In this context, it is important to examine how monetary policy should respond to asset price inflation under stable price development. In section IV I further discuss practical issues related to the preemptive conduct of monetary policy. In considering the role of asset prices in monetary policy, I also suggest in this section the importance of detecting whether asset

prices fluctuations properly reflect movements in their underlying determinants, or fundamentals. In Section V, I discuss several issues concerning how to ensure the compatibility of price stability and financial stability simultaneously, and emphasize the importance of pursuing 'sustainable price stability,' not 'measured price stability.' Section VI concludes the paper.

II. Asset Price Fluctuations and Macroeconomic Activity

In this section, I will examine the role of asset prices when they are considered as target or information variables, and summarize the relationship between asset price fluctuations and macroeconomic activity. In the following, in order to examine the properties of asset prices in relation to the current prices of goods and services, I will first review the attempt to incorporate asset prices into the price index concept, rather than treating the two separately. Then, I will explore the mechanism by which asset price fluctuations affect the real economic activity.

A. The Inclusion of Asset Prices in Conventional Price Indices[2]

No attempt is usually made to include asset price information directly into the procedure for computing price indices. This is because price indices are thought of as tracing a consumption activity of a representative consumer at a particular point in time, and, thus, it would not be consistent to include asset prices, which are a source of the flow of goods and services. In this context, price indices cover housing prices as a rent (rented houses) or an imputed rent (privately owned houses), rather than being directly included. In other word, the inclusion of housing prices into current price indices raises a problem of double counting, since current price indices generally cover rent.

In order to include asset prices in price indices, therefore, it is necessary to change the concept of price indices so that it focuses on current consumption activity to trace price changes from the base period up to the current period. In this case, it would be reasonable to extend the conventional price index concept into a dynamic framework so as to trace intertemporal changes in the cost of living.

In order to provide a price index concept that takes into account asset price fluctuations, Alchian and Klein (1973) proposed the idea of the intertemporal cost of living index (ICLI). The ICLI traces the intertemporal changes in the cost of living that

[2] This subsection draws from Shiratsuka (1999b) where the points are developed more fully.

are required to achieve a given level of intertemporal utility. Consumer behavior possesses a dynamic nature so that current consumption depends on not only current prices and incomes but also on the future path of prices and incomes. Considering the intertemporal maximization problem for a household, its budget constraint is its lifetime income.[3] In this case, we can take asset prices as a proxy for the future prices of goods and services.

Although the ICLI has good features from a theoretical perspective, it is too abstract to base a practical price index on. Shibuya (1992) proposed a practical index formula based on the ICLI, and named it a dynamic equilibrium price index (DEPI), which incorporates dynamic elements into a realistic price index formula. To this end, Shibuya (1992) employs a one-good and time-separable Cobb-Douglas utility function, instead of the general form of preference assumed in Alchian and Klein (1973). Then, he derives the DEPI as a weighted geometric mean of the current price index (the GDP deflator: p_t) and asset price changes (the value of the national wealth: q_t),[4] as shown in equation (1):

$$DEPI_{0t} = \left(\frac{p_t}{p_0}\right)^{\alpha} \cdot \left(\frac{q_t}{q_0}\right)^{1-\alpha} \tag{1}$$

where α represent the weighting used for current goods and services $\alpha=\rho/(1+\rho)$, and ρ represents time preference.[5]

Figure 1, which is taken from Shiratsuka (1999b), exhibits the movements of the DEPI from 1957 to 1997. This figure shows the large divergence between the DEPI and

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[3] A necessary condition for this discussion is that there exists a perfect capital market, which makes it possible to borrow money against collateral of all tangible and intangible assets.

[4] In calculating the DEPI, we should use asset prices to represent the value of total assets, which includes all the intangible assets, such as human capital. Shibuya (1992) used the data on national wealth in the Annual Report on National Accounts (Economic Planning Agency), which has the broadest coverage among the readily available data sources. However, its coverage of intangible assets, which consist largely of households' assets, is very limited.

[5] α can be written as $\alpha_t = (1+\rho)^{-t} / \sum_{s=0}^{\infty}(1+\rho)^{-s}$ in general form, and these are the normalized factors of time preference, which add up to one. Thus, when we calculate the DEPI on a monthly and quarterly basis, we have to use the rate of time preference transformed into a monthly and quarterly basis.

the GDP deflator during the late 1960s, the early and late 1970s, and the early 1980s. Focusing on the development since the mid-1980s, the DEPI rose sharply from 1986 to 1990, while the GDP deflator remained relatively stable, and then the growth rate of the DEPI has turned negative since 1991. During this period, the inflation rate as measured by the GDP deflator accelerated until 1991, and the inflation rate has remained subdued since 1992. This development of the DEPI might be interpreted as an understatement of the inflationary pressure that occurred in the late 1980s and the deflationary pressure that has been present since the early 1990s.

The concept of DEPI, which extends the conventional price index into a dynamic framework and incorporates asset price information into the inflation measure, is highly regarded from the viewpoint of theoretical consistency. However, it is difficult for monetary policy makers to expect it to be more than a supplementary indicator for monetary policy judgment. This is because the DEPI inherits the practical problems that make it less attractive to employ as a target indicator.[6]

The first problem inherent in the DEPI is that asset price changes do not necessarily mean future price changes because there are a lot of sources of asset price fluctuation besides private-sector expectations regarding the future course of inflation.[7] Now, let me suppose that land prices increase as a consequence of technological innovations, such as advances in construction technology for the taller skyscrapers and 'smart' buildings. In this case, the increase in land prices does not necessarily imply an increase in the future prices of services because a larger office area is available from the same are of land. However, the DEPI judges that the changes in relative prices between current prices and asset prices, which reflect technological progress, constitute inflation.

The deviation of asset prices from their fundamental values, i.e., an asset price bubble, is likely to happen when the productivity increase behind rising land prices is based on euphoria, and rising land prices are themselves driven by speculation. In addition, since asset prices depend on a risk premium, asset prices will increase if changes in the structure of market participants lower the degree of risk aversion, or market participants consider that future uncertainty is decreasing.

The second problem is the appropriateness of assigning a large weighting to asset

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[6] For the details, see Shiratsuka (1999b).

[7] For example, Shiratsuka (1999b) shows that Granger causality from asset prices to the GDP deflator is highly sensitive to the macroeconomic environment by conducting a rolling regression with a 5-variable VAR model, which contains real GDP, money supply, and long-term nominal interest rate in addition to the GDP deflator and asset prices.

prices in the DEPI. The DEPI is defined as the geometric weighted mean of the current price index and asset prices, and its weight for asset prices is almost equal to one, while that for the current price index is almost zero. From the theoretical viewpoint of the intertemporal optimization behavior of economic agents, it is reasonable to assign a small weight to the current price index, which just aggregates prices for current goods and services at a particular point in time. However, the DEPI will be quite a similar indicator to asset prices, if one accepts the theoretical weights for the current price index and asset prices. It might be the case that, even though the current prices fluctuate markedly, the DEPI would show a negligible fluctuation, as long as asset prices remain stable.

The third problem is the accuracy of asset price statistics. While the current price indices are also affected by measurement errors, their reliability is by far higher than that of asset price statistics.[8] In this case, it is crucial to emphasize that the asset prices employed in the DEPI must cover all assets that are sources of present and future consumption, such as tangible and intangible, financial and non-financial, and human and non-human assets. This implies difficulty in constructing a reliable price index that includes asset prices.

The above analysis indicates that the DEPI is judged to be inappropriate as a policy target indicator, and it is limited as an information variable for monetary policy judgment. However, it is not necessary to construct a composite indicator, like the DEPI, if one intends to use it as just one of several information variables. Rather, it provides more information content than the DEPI to monitor separately the current price indices and asset prices.

B. The Transmission of Asset Price Fluctuations to Real Economic Activity

As a next step, let me examine the relationship between asset price fluctuations and real economic activity. The relevant point here is to identify the determinants of asset prices.

Based on the discounted present value formula, which is the basic theoretical framework for asset pricing, the price of an asset is equal to the discounted present value of its future income flows. Profit maximization of the firm indicates that its marginal revenue corresponds to the marginal productivity of its assets. Therefore, if we assume that the marginal productivity of capital (*MPK*), the nominal interest rate (r) and the expected rate of inflation (π) are all constant over time, the real asset price (q/p) is determined as follows:

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[8] Regarding the issues related to the measurement errors in Japan's price indices, see Shiratsuka (1998, 1999a), and Bank of Japan, Research and Statistics Department (2000).

$$q/p = MPK/(r-\pi). \tag{2}$$

This equation implies that the expected return on assets and the expected nominal rate determines the fluctuation of real asset prices (fundamentals).

If asset price fluctuations properly reflect movements in their underlying determinants, economic resources are utilized in the most efficient way in line with real economic activity. Therefore, to the extent that asset prices fluctuations are consistent with the fundamental values, they may be left out of consideration in the conduct of monetary policy.

Nevertheless, the prolonged deviation of asset prices from their fundamental value is often called a 'bubble.' In general, asset prices reflect investors' expectations about the future, and such expectations seem to have played an important role in the sustainability of bubbles.[9] A 'broadly defined bubble' occurs because of excessive optimism regarding the marginal productivity of various assets. However, even if investors are perfectly rational, actual stock prices may contain a bubble element and, therefore, there can be a divergence between asset prices and their fundamental values, or a 'narrowly defined bubble.' This is because asset prices could continue to increase if investors judge that they will be able to earn enough profit to ensure that they profit from arbitrage conditions with regard to other asset prices by disposing of their assets before the collapse of asset prices. However, it is inevitable that such excessive optimism will fail to live up to expectations, and, as a result, asset prices, whose increase includes a bubble element, will unavoidably collapse.

These asset price fluctuations reflecting bubble elements affect real economic activity mainly through (1) wealth effects on expenditure activities, and (2) the effect of changes in the external finance premium on investment activities.[10] Since the rise in asset prices, even though reflecting the bubble, act in a positive direction, the adverse effects are hardly recognized as long as the economy is expanding smoothly. By contrast, the adverse effects of the bubble are materialized as stresses expressed by the

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[9] In order to exclude the bubble path, it is assumed that asset prices will not diverge to infinity.

[10] Bernanke and Gertler (1995) explain that frictions in financial markets, such as imperfect information and costly enforcement of contracts, generate a difference in costs between external funds such as bond financing, and internal funds such as retaining earnings. They call the above wedge the external finance premium, and emphasize that the external finance premium fluctuates coincidentally with business cycles, thereby propagating the conventional effect of interest rates on aggregate demand.

unanticipated correction of asset prices to the real side of the economy and the financial system. It should be noted, in this case, that leaving intensified bullish expectations alone might exaggerate the adverse effects by allowing expanded fluctuations in asset prices.

C. Asymmetric Effects of Asset Price Fluctuations

In examining the effects of asset price fluctuations on macroeconomic activity, it is important to note the following two points. First, such effects are asymmetric, so that the declines in asset prices have a stronger effect on the economy than do increases in asset prices. Second, the magnitude of effects varies in accordance with the duration of the asset price bubble and of the adjustment period after the bubble bursts.[11]

As Okina, Shirakawa, and Shiratsuka (2000) point out, the adverse effects of the bursting of the bubble are deemed as triggering a prolonged recession via the following three mechanisms with the benefit of hindsight from Japan's experience of the bubble period.[12] Of these three, while the first works symmetrically between the period of the emergence and expansion of the bubble and the period of the bursting of the bubble, the effects of the second and third mechanisms are disproportionately larger during the period of the bursting of the bubble.

The first mechanism is a decline in economic activity as a result of the correction of intensified bullish expectations. For example, we can point to the reversed wealth effects on expenditure and on classical stock adjustment in the process of the bursting of the asset price bubble.

The second mechanism is a reduction in the economic value of capital equipment and reduced supply capacity. During the bubble period, capital expenditures increased dramatically on the premise of higher potential growth in the economy. The economic value of such physical assets fell sharply because they were unlikely to be utilized in the future and it would have been costly to convert them to different usage. In this context, we should recognize that the serious dynamic resource misallocation caused by

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[11] Kent and Lowe (1997) expressed similar views to those of the authors, emphasizing that an early rise in interest rates would heighten the possibility of the bubble bursting, thereby leading to smaller fluctuations in the real economy and inflation through smaller negative effects on the financial system after the bursting of the bubble.

[12] Okina, Shirakawa, and Shiratsuka (2000) define the bubble period as the period as lasting from 1987 to 1990, from the viewpoint of coexistence of three factors of bubble economy, that is, a remarkable increase in asset prices, an expansion of monetary aggregates and credit, and an over-heating of economic activity.

misguided prices during the bubble period was a mechanism that helped to induce economic stagnation.

The third and the most important mechanism is a so-called balance sheet adjustment which occurred as the fall in asset prices eroded the asset quality of both lenders and borrowers, and reduced credit availability because capital bases deteriorated, leading to a decline in economic activity.[13] The capital base functions as a buffer against future risks and losses. Such a function is not clearly recognized as long as the economy is expanding smoothly. The effects of a capital base shortage will materialize once the outlook for economic expansion changes. After the bursting of the bubble, as asset prices fell and the capital base was substantially reduced, the possibility of bankruptcy increased among financial institutions, firms, and individuals. Under such circumstances, economic agents whose capital base had been eroded became cautious in taking on risks and also in doing business with counterparties whose capital base had been eroded.

In understanding the latter mechanism of balance sheet adjustment, 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. After the bursting of the bubble, as asset prices fell and the capital base was substantially reduced, the possibility of bankruptcy increased among financial institutions, firms, and individuals, making economic agents cautious in taking risks.

Furthermore, the adverse effects of the bursting of bubble on the real economic activity are exaggerated through the financial system, especially when financial institutions are deeply involved in financial intermediation to purchase various physical assets. Purchases of physical assets during the bubble period were based on misguided prices. This is because the economic value of those physical assets fell sharply because they were unlikely to be utilized in the future and it would have been costly to convert them to different uses.

As a result, the deterioration of balance sheets of firms and financial institutions and the resultant malfunctioning of financial intermediation result in decline in aggregate demand in the short run, and, moreover, a reduction of aggregate supply due

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

to lowering capital formation in the long run. It is quite important to note that the serious dynamic resource misallocation caused by misguided prices during the bubble period was a mechanism that helped to induce economic stagnation.

III. Asset Price Fluctuations and Monetary Policy

As a next step, I will explore the issues concerning how monetary policymakers should place asset prices in relation to the conduct of monetary policy, and how they should respond to the fluctuations in asset prices.

A. Application of the Taylor Rule to Policy Reaction to Potential Inflationary Pressures

In order to achieve price stability in the long run, how should monetary policy respond to asset price fluctuations? The prevailing consensus among economists and central bankers is that monetary policy should not target asset prices directly, but should respond to their effects on real economic activities and on the general price level.[14] In this context, a recent study by Bernanke and Gertler (1999) has lately attracted considerable attention. They argue that central banks can treat price stability and financial stability as consistent and mutually reinforcing objectives by adopting a strategy of 'flexible inflation targeting.'[15]

Let me examine the above argument by Bernanke and Gertler (1999) by using a Taylor-type policy reaction function. The basic formula of the Taylor rule is that the level of the policy target rate is determined by the current level of two variables, the rate of inflation and the output gap (Taylor [1993]), or the following specification:

$$i_t = \bar{i} + \beta(\pi_t - \pi^*) + \gamma(y_t - y_t^*), \tag{3}$$

where i_t is the short-term nominal interest rate at period t as an instrument of monetary

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[14] For example, Crockett (1998) states that "the prevailing consensus is that monetary policy should not target asset prices in any direct fashion but should rather focus on achieving price stability in goods markets and creating financial systems strong enough to survive asset price instability."

[15] Bernanke and Gertler (1999) further argue that "By focusing on the inflationary or deflationary pressures generated by asset price movements, a central bank effectively responds to toxic side effects of asset booms and busts without getting into the business of deciding what is a fundamental and what is not" (p. 18). I am skeptical about this argument, and will examine this point in detail in the next section.

policy, $\bar{i}$ is the equilibrium short-term nominal interest rate, y_t is the output gap at period t, and y_t^* is the equilibrium level of the output gap.

The standard interpretation of the Taylor rule is that a central bank has two objectives, inflation and output gap, whose relative importance is evaluated by the coefficients of each objective variable. At the same time, it can be viewed as incorporating a preemptive response to inflation, because current inflation and the output gap are critical variables in forecasting future inflation.[16]

In considering the monetary policy response to an asset price bubble, it is important to deal with a possible bubble in a preemptive manner with a view to the future risk of inflation rather than to make a belated response only after inflation or the existence of a bubble visibly materializes. In view of Taylor-type policy reaction function, asset price fluctuations enter the monetary policy decision in two ways. First, since effects of asset price fluctuations are included in the changes in the output gap, guiding short-term nominal interest rates in line with Taylor rule will enable a central bank to deal with the potential inflationary pressure in a preemptive manner. Second, a standard Taylor-type rule should be extended to incorporate asset price information directly.

B. A Case from Japan's Experience during the Bubble Period

Next, let me assess the attractiveness of the aforementioned framework for dealing with the potential risks stemming from asset price fluctuations in a more practical context, by focusing on Japan's experience of the emergence, expansion, and bursting of the asset price bubble.

Bernanke and Gertler (1999), as mentioned above, conduct a simulation using structural model that incorporates the optimization behavior of households and firms as well as a policy reaction function with expected inflation and asset prices as explanatory variables (Figure 2). Based on their simulation results using data for Japan, they point out the following two points. First, it is inappropriate to incorporate asset prices directly into the policy reaction function, because such treatment is likely to aggravate

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[16] For example, Meyer (2000) emphasizes that the Taylor rule is an attractive and simple guidepost for the conduct of a discretionary monetary policy because it "responds directly to deviations from the Federal Reserve's objectives–price stability and an equilibrium utilization rate" as well as because "it incorporates a preemptive response to inflation" and "is closely aligned both with the objectives of monetary policy and with the model that governs inflation dynamics." In addition, Goodhart (1999) argues that the Taylor rule employs current inflation and the GDP gap as explanatory variables, because these two variables are the two most important factors for forecasting future inflation.

the economic fluctuations. Second, if the target interest rate had been raised from around 4% to 8% in 1988, the emergence of the bubble could have been prevented.[17]

However, their conclusion is obtained because the Taylor rule, which they use to compute the optimal call rate, suggests a rise in the rate in response to the sharp pickup in real economic activity then rather than to inflationary pressure. Raising rates just because real GDP is growing strongly but with no inflation is hard especially when favorable supply shocks are thought to be hitting the economy, leading to high potential growth. In fact, BOJ Deputy Governor Yamaguchi threw some doubt on the practical validity of simulation results in Bernanke and Gertler (1999) by commenting that "I don't see how a central bank can increase interest to 8 or 10% when we don't have inflation at all" (Yamaguchi [1999]).

C. The Assignment of Monetary Policy with regard to Asset Price Fluctuation under Stable Price Development

Then, how monetary policy should respond to asset price inflation under stable price development? In considering the relationship between asset price fluctuations and monetary policy, it is not so difficult for a central bank to deal with asset price inflation if price stability is undermined. Unfortunately, asset price inflation may occur under relatively low and stable price development, and it is quite difficult for a central bank to raise interest rates just because of potential risks inherent in asset price inflation when there is no inflation. Thus, a central bank may encounter difficulties when asset prices increase excessively, reflecting intensified bullish expectations under favorable price development.

To deal with the above problem, in theory, it is possible to assume lexicographic ordering among monetary policy objectives, among which price stability is of primary importance, and consider other objectives only when the inflation rate remains within the target range.[18] But in practice, considering Japan's financial and economic development in the late 1980s, monetary policy would have tightened just because of

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[17] The simulation by Bernanke and Gertler (1999) shows that the target interest rate temporarily jumped in 1987 and 1997. Such temporary fluctuations in the target interest rate might perhaps reflect the effects of the introduction of the consumption tax (3%) in April 1989 and the hike in the consumption tax (from 3% to 5%) in 1997.

[18] Statement given by Professor Fukao at Keio University at the workshop sponsored by the Institute for Monetary and Economic Studies, Bank of Japan on January 25, 2000 (See Bank of Japan, Institute for Monetary and Economic Studies [2000]). See also discussion in Kosai, Ito, and Arioka (2000).

the possibility of asset price bubbles under stable price condition. Thus, monetary policy should be conducted to achieve the secondary objectives, even though doing so is not consistent with the conduct of policy necessary to pursue the primary objective. However, the secondary objectives will never surpass the primary objective in the lexicographic ordering.

Needless to say, no central bank assumes such an extreme preference among its policy objectives, but in light of Japan's experience in the bubble period, a preemptive policy response was indeed needed under stable price development in the late 1980s. At the same time, since there existed a prevailing recognition that both the productivity and the growth potential of Japan's economy had increased, the necessity of such preemptive action was not viewed as sufficiently convincing.

The above argument indicates that the following two cases cannot be treated in the same way. One is the case that the needed policy response is in the same direction to achieve both the primary and secondary objectives, but that additional action is required to ensure the secondary objective (for example, further monetary tightening to deal with rapid asset price inflation rather than current inflation). The other is the case that the needed policy response is in the opposite direction, and that policy reversal is necessary to pursue the secondary objective while the primary objective appears to be maintained (for example, an early policy reversal in the direction of monetary tightening to prevent the adverse effects of asset price inflation, or a possible bubble, from materializing at a time of stable price development).

The contradictory signals given by price development and asset prices make monetary policy judgment extremely difficult, because it is indeed hard to identify whether what is being observed is really a bubble or not in the very process of the expansion of a bubble. Note, however, that it is fundamentally impossible to resolve this problem. The most important point for conducting monetary policy in preemptive manner is, given the above limitation, how to assess potential risks in such a consistent way as to ensure price stability in the long run. Such efforts will be sure to lead to making more convincing arguments in favor of the preemptive policy response.

It should be noted that an assessment of the potential risks differs depending on how long a time horizon is assumed, because such an assessment is made when risks to the economy are nowhere to be seen. This puts a central bank in a dilemma in that preemptive action is not attainable if the central bank waits until most people agree upon the necessity for action to be taken. Therefore, it is important to compare the potential risks inherent in a possible scenario of the future course of financial and economic development.

IV. Practical Issues for the Conduct of Monetary Policy in Dealing with Potential Risks

In this section, I will examine the practical problems involved in dealing preemptively with the potential risk associated with asset price fluctuations. To assess the practical validity of Bernanke and Gertler's (1999) simulation results, the following three points should be examined further: (1) measurement errors in the output gap, (2) the effects of structural changes, and (3) adverse effects on the financial system.

A. Measurement Errors in the Output Gap

First, let me examine the effects of measurement errors in detecting potential inflationary pressure.

It is often pointed out that estimates of the output gap are very sensitive to *ex-post* data revision (Orphanides [2000], Orphanides *et al*. [1999]). Orphanides [2000] suggests that proper recognition of our limited knowledge of the current state of economy and an accordingly lowered objective of economic stabilization are important in averting policy mistakes in the future.

In the case of Japan, Kamada and Masuda (2000) examine the magnitude of measurement errors in the output gap in terms of estimation procedures and historical revision of data. Their main findings are twofold. First, the difference between contemporaneous estimates of the output gap and the current estimates expanded in the 1990s. Second, the ad hoc assumption that the capacity utilization rate in the non-manufacturing sector is equivalent to 100 percent is the most crucial source of measurement errors in the output gap. In this context, they emphasize that new estimates of the output gap, which improve the estimation procedure by estimating the capacity utilization rate in the non-manufacturing sector as well as dropping the assumption of a linear trend in total factor productivity, is more consistent with other indicators for demand-supply conditions.

Figure 3 plots three estimates of output gap in the aforementioned study by Kamada and Masuda (2000). GAP1 is based on the new estimation procedure that adjusts the capacity utilization rate in the non-manufacturing sector, and GAP2 is based on the previous estimation procedure that assumes a full capacity utilization rate in the non-manufacturing sector. These two series are computed from the currently available data. GAP3 is computed by using the same procedure as GAP2, but from real-time data that are contemporaneously available for each time period. Although GAP2 and GAP3 show parallel movement before 1995 while there are significant deviations since then, GAP3 fluctuates up and down. This implies serious effects of *ex-post* data revision on the measurement of the output gap, thereby making it difficult to detect the underlying

movements of the output gap on a real time basis. GAP1 constantly exhibits a larger magnitude of output gap, compared with the GAP2 and GAP3, due to the impact of adjustment in the capacity utilization rate in the non-manufacturing sector. In addition, GAP1 shows a striking contrast with GAP2 and GAP3 in the late 1990s. That is, the reduction of the output gap in 1995-96 is milder, and, as a result, the expansion of the output gap in 1997-99 is relatively small, compared with GAP2 and GAP3.

Figure 4 compares the movements of the target rate computed from a Taylor-type policy reaction function of equation (4), which takes into account the tendency of central banks to smooth changes in interest rates by gradually adjusting the target rate to optimal values computed from equation (3): [19]

$$i_t = (1-\rho)[\bar{i} + \beta(\pi_t^e - \pi^*) + \gamma(y_t - y_t^*)] + \rho i_{t-1}, \qquad (4)$$

where parameter ρ captures the degree of 'interest rate smoothing.' I assume that the parameters for the inflation rate β and the output gap γ are 1.5 and 1.0, respectively, following the estimates in Kimura and Tanemura (2000).[20] I also assume the two formulas of the Taylor rule, i.e. both with and without interest rate smoothing (partial and perfect adjustment mechanisms), where the adjustment parameter of the former ρ is assumed to be 0.85.

Looking at the estimates of the partial adjustment model in the upper panel of the figure, the target rates implied by the Taylor-type reaction function generally track the movements of actual rates, regardless of the output gap employed. In contrast, estimates of the perfect adjustment model in the lower panel show a significant deviation between target and actual rates: target rates exceed actual rates in the phase of monetary contraction, and, on the contrary, target rates fall below the actual rate in the phase of monetary easing. In addition, estimates from GAP3 (real time estimates) move up and down significantly, reflecting fluctuations in the estimate of the output gap.

The above simulation results of a Taylor-type reaction function indicate that

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[19] Brainard (1967) points out that if there is uncertainty with respect to the multiplier effect of economic policy measures, then the authorities should adopt a conservative approach. See also Blinder (1999) on this point. However, Stock (1998), by using a small US model, contends that it is desirable to adopt an aggressive policy rule when the economy is undergoing structural change.

[20] In computing the target rate, I assume that the equilibrium level of the output gap corresponds to the average value from 1983/II to 1996/IV and that there is perfect foresight regarding future inflation one year ahead.

problems of measurement errors in the output gap can be mitigated to some extent by employing a partial adjustment mechanism in the policy reaction function. In a perfect adjustment mechanism, however, the target rate responds to fluctuations in the output gap too vividly and shows volatile movement, implying that such a mechanism can hardly be employed as a yardstick for policy evaluation.

B. Structural Changes and the Assessment of Potential Risks

Next, let me examine the practical validity of Bernanke and Gertler's (1999) argument that potential inflationary pressure can be assessed "without getting into the business of deciding what is a fundamental and what is not."

In this context, the appropriateness of their assumption that there are no structural changes (i.e., that the structural model is unchanging over time) is also open to further question. This assumption implies that a 'broadly defined bubble,' which is caused by the excessive optimism of economic agents, is necessarily excluded from the scope of the simulation, and that the asset price bubble in their model is restricted to a 'narrowly defined bubble.' However, it is euphoria that triggers the bubbles that produce a serious effect on the economy. Cases in point are the historical episodes of a so-called 'New Economy,' when a bubble is created by excessive optimism under conditions of long-run economic prosperity. In this case, it is deemed important to examine the possibility of a shift in the potential output level by taking account of structural changes with uncertain magnitude and timing.

For example, Meyer (2000) states that a major challenge for U.S. monetary policy at the moment 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. More precisely, taking account of the recent development in the monetary policy rule under uncertainty, he emphasized the following three points: (1) the estimate of the GDP gap should be updated on the basis of all available data; (2) the aggressiveness of response to the GDP gaps between actual and target values should be adjusted in light of the uncertainty about their measurement; and (3) policy should becomes less preemptive and more aggressively reactive as the degree of uncertainty about the GDP gap rises.

Furthermore, Meyer (2000) points out that the current strategy can be viewed as 'a nonlinear Taylor rule under uncertainty,' which is illustrated in Figure 5. That is, although the response to the GDP gap is attenuated in a region around the best estimate of the potential GDP, the policy response should become more aggressive once the GDP gap moves sufficiently below or above the best estimate of the neutral level. The

nonlinear Taylor rule can be regarded as an application of the 'opportunistic approach'[21] to policy evaluation of the GDP gap, which is a preemptive component in a Taylor-type policy reaction function.[22]

The key challenges for U.S. monetary policy makers at the moment, expressed in Meyer (2000), clearly show that the assessment of asset prices relative to their fundamental values is crucially important in evaluating potential inflationary pressure, while such an assessment becomes increasingly difficult in the face of euphoria. This implies, contrary to Bernanke and Gertler's (1999) argument, that monetary policy makers are unlikely to evaluate potential inflationary pressure stemming from asset price fluctuations "without getting into the business of deciding what is a fundamental and what is not." Instead, they are required to come up with practical ideas to deal with intensified ambiguity in our understanding of the structure of the economy, and the increased risk of measurement error with respect to key variables under structural changes of uncertain magnitude and timing.

C. Preemptive Actions and Stability in the Financial System

Finally, let me examine how we should consider the possible adverse effects on financial system of responding preemptively to potential risks in the economy.

The monetary policy of a central bank is conducted using the financial markets and financial system as its transmission channel. Therefore, monetary policy will be less effective once the financial system become unstable. If a financial crisis occurs and large-scale bank closures take place, it is most likely that markets will malfunction and be segmented, since liquidity constraints prevent financial institutions from arbitraging and dealing in money and currency markets.[23]

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[21] The opportunistic approach is the notion that, while maintaining price stability as the ultimate goal of monetary policy, monetary authorities should refrain from taking rough-and-ready policy responses, considering the possibility of favorable external shocks on inflation if and when inflation rate is at a level that is not so divergent from the long-term objective rate, or is not likely to diverge from the current rate. For details, see Orphanides and Wilcox (1996).

[22] It should be noted that the range of attenuation should be updated asymmetrically, reflecting subjective risk assessment on upward and downward risks in economic forecasting.

[23] In this context, the role of monetary policy under conditions of financial instability is an important issue to be considered. Saito and Shiratsuka (2000) view financial crises as the failure of arbitrage among financial markets, and take the 'Japan premium' phenomenon observed in offshore money markets as an important example in favor of this view. Based on this perspective, they explore the possibility that a

In this context, Clarida, Galí, and Gertler (1999), for example, point out that concern about stability in the financial system is one possible explanation of why central banks alter target rates gradually, a procedure which is generally referred to as 'interest rate smoothing.' In fact, it is hard to deny that the possibility that sharp unanticipated increases in interest rates would generate huge capital losses for financial institutions, thereby possibly leading to the disruption of financial markets (see, for example, Goodfriend [1991]).

As Okina, Shirakawa, and Shiratsuka (2000) point out, however, bullish expectations were intensified so much during the emergence and expansion of the bubble that a small rise in interest rates would have had little impact on such expectations. In such circumstances, it is apparent that an increase in interest rates would have had to be fairly large to induce a change in market expectations.

Thus, the question we have to ask here is whether it is practically possible for a central bank to raise interest rates by sufficient increments to contain the expansion of a bubble in a preemptive but predictable manner.[24] In this case, a further question that needs to be considered is that of the 'communication with market.' A preemptive policy action is likely to require a central bank to effect policy actions, even if its judgement is still a minority view. Sufficient communication with market is not always the same thing as avoiding any surprise to financial markets.[25]

In fact, financial market participants often behave myopically, and 'misapprehensions' of financial markets about the central banks' intentions can never be entirely eliminated. In this context, former FRB Vice Chairman Blinder (Blinder [1998]) states that, on the one hand, "in a literal sense, independence from the financial

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central bank may play an important role in recovering market liquidity by means of money market operations when financial markets are severely segmented in the absence of arbitrage during financial crises. In this sense, it should be noted that in the midst of financial crises, the border of monetary and prudential policies is becoming unclear in situations of stress in financial markets.

[24] If a central bank raises interest rates at an early stage by a small amount, it may be possible to expect to change incorrect expectations regarding the continuation of low interest rates for an extended period of time. However, on the contrary, if such a small and early increase in interest rates succeeds in nipping inflationary pressure in the bud, it is hard to deny that it will only further strengthen already bullish expectations, thus leading to an expansion of the bubble. For further discussion on this point, see Okina, Shirakawa, and Shiratsuka (2000) and Goodfriend (2000).

[25] In this regard, Blinder (1998) points out that "a successful stabilization policy based on preemptive strikes will appear to be misguided and may therefore leave the central bank open to severe criticism."

markets is both unattainable and undesirable. Monetary Policy works *through* markets, so *perceptions* of likely market reactions must be relevant to policy formulation and *actual* market reactions must be relevant to the timing and magnitude of monetary policy effects" (p. 60), but, on the other hand, "Following the markets may be a nice way to avoid unsettling financial surprises, which is a legitimate end in itself. But I fear it may produce rather poor monetary policy, for several reasons" (pp. 60-61). Then he further points out the potential risks of following the markets, such as (1) a tendency to run with the herd and to overreact; (2) a susceptibility to fads and speculative bubbles; and (3) traders behaving as if they have ludicrously short time horizons.

However, the market might have not totally 'misapprehended' without reason, and it should be possible for a central bank to reduce such 'misapprehensions' by offering the market clearer information on the aims and strategy of monetary policy. Such efforts will surely contribute to stabilizing the formation of market expectations and will enhance the effectiveness of monetary policy.

V. Consistency of Price Stability and Financial Stability

As a next step, I examine in this section how we can ensure the consistency of price stability and stability of financial system? In this regard, Crockett (2000) states that "the economic history of the twentieth century can be seen as a quest to simultaneously secure the elusive twin goals of monetary and financial stability." In other words, how to achieve consistency of price stability and financial stability in practice is an important unresolved issue.

A. A Preemptive Policy Response to Potential Risks

As evidenced by the experience of Japan's bubble period, a bubble is not generated suddenly, but expands gradually. Therefore, it is important to deal with a possible bubble in a preemptive manner with a view to the future risk of inflation rather than to make a belated response only after inflation or the existence of a bubble visibly materializes.

However, as Okina, Shirakawa, and Shiratsuka (2000) point out, it is difficult to identify whether what is being observed is really a bubble or not in the very process of the expansion of a bubble. This is because, within the contemporaneously available information, the possibility cannot be denied that the economic structure might be undergoing change. In such a case, the central bank is 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. Put metaphorically, 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 transitionary 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 statistical errors the central bank is more likely to make, it is important in the conduct of monetary policy to consider not only the probability of making an error but also the relative cost of each error. Based on the experience of Japan's bubble period, it is important for the central bank to recognize that making a Type II error is fatal compared with a Type I error when faced with a bubble-like phenomenon.[26]

Of course, a comparison of risks inherent in the two types of error does not necessarily imply that monetary policy should be conducted by considering which is the fatal risk. Even though the risk of a bubble is regarded as fatal, we should perhaps choose a gradual tightening rather than a rapid tightening in the conduct of monetary policy. However, even in such a case, we should take a pragmatic approach by flexibly selecting the degree of tightening while paying due attention to not only a Type II error but also a Type I error.

B. Price Stability and Sustainable Economic Growth

Then, how should a preemptive monetary policy be conducted? To this end, Okina, Shirakawa, and Shiratsuka (2000) stress the importance of conducting monetary policy with emphasis on maintaining an environment conducive to the sustainable economic growth that is the ultimate goal of price stability. In this case, a favorable environment presumes both price stability and financial system stability, because proper functioning of financial system is also an indispensable basis for sustainable economic growth.

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[26] Based on the experience of Japan's bubble period, it is important for the central bank to recognize that making a Type II error is fatal compared with the Type I error when faced with bubble-like phenomena. It should be noted, however, that a comparison of risks inherent in the two types of errors does not necessarily imply that monetary policy should be conducted by considering only which is the fatal risk.

So long as long-run equilibrium conditions are stable, monetary policy will probably be effective enough to maintain a sound economic environment, including financial system stability, by achieving price stability as a nominal anchor for the economy. However, once the perception of changing economic structure spreads, it may be becoming questionable whether it is sufficient to achieve low measured inflation in the short run in order to ensure sustainable stability of the economy. Of course, even though thinking this way, it is not necessarily the case that it is advisable for a central bank to aim at correcting 'over-valuation' of asset prices directly, based on their assessment of fundamentals of asset prices.

In light of the above discussion, it seems more 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. Then, how should price stability be defined in practice? 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' 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 an important basis for sustainable economic growth.

'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. However, since movements of such indicators are affected by various temporary shocks and measurement errors, 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.[27]

From this viewpoint, as Shiratsuka (2000) points out, it is deemed important that a central bank should pursue 'sustainable price stability' that supports medium to long-term sustainable growth, not 'measured price stability' to maintain a specific rate of

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[27] 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 the both 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.

inflation measured by a specific price index at a particular point in time. More concretely, price stability is important because it is a necessary condition for maximizing economic stability and efficiency. In this case, an important yardstick for price stability is whether the stabilization of public expectations regarding inflation is attained.[28]

A central bank is required to accomplish 'sustainable price stability' in the first place, and, at the same time, is also required to maintain policy accountability based on committing itself to 'measured price stability' according to certain criteria. However, as Shiratsuka (2000) emphasizes, the consistency of 'measured price stability' with 'sustainable price stability' is not always maintained so as to support sustainable economic growth in the long run. Therefore, it is important for a central bank to pursue 'sustainable price stability' as the primary objective for monetary policy, while assuring accountability by showing a quantitative assessment of 'measured price stability.'

C. An Assessment of the Sustainability of the Financial and Economic Environment

In order to achieve 'sustainable price stability,' it is 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.[29]

Okina, Shirakawa, and Shiratsuka (2000) report that the expected growth rate of nominal GDP computed from the equity yield spread in 1990 is as high as 8 percentage points below the standard assumption based on the discount factor (Figure 6).[30] However, in view of the low inflation at the time, it is almost impossible to believe that

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[28] 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]).

[29] In this context, Okina, Shirakawa, and Shiratsuka (2000) point out, based on the experience of Japan's bubble period, the importance of examining potential risks from five perspectives: the output gap in the economy, money supply and credit, asset prices, the behavior of financial institutions, and the interaction of various risks.

[30] Okina, Shirakawa, and Shiratsuka (2000) compute the risk premium as follows. For example the difference between the average annualized nominal GDP growth for the ten years from 1984 through 1993 (5.3 percent) and the average yield spread during the same period (3.4 percent) is 1.9 percentage points. The difference between the nominal growth rate of 1994 (6.9 percent) when the declining trend of nominal GDP came to a halt and the yield spread of the same year (4.5 percent) is 2.4 percent.

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.[31]

Against the backdrop of such unsustainable bullish expectations, financial institutions took risks that were out of proportion to expected profits. In retrospect, it is evident that there was a lack of recognition of risks related to the economy as a whole and to the financial system, and especially a lack of recognition of the concentration and interaction of risks. As supporting evidence on this point, Okina, Shirakawa, and Shiratsuka (2000) compare profitability, the growth rate of loans, and the ratio of real estate-related lending to total lending of seven failed and survived relatively small regional banks, which are member banks of the Second Regional Banks Association (Figure 7). It is confirmed that these failed banks were already exhibiting poor profitability in the first half of the 1980s and aggressively expanded their loans to property-related firms from the mid-1980s onward.

The interaction of risks takes various forms, and such aggregate risks are not merely the simple sum of risks recognized by individual economic agents. Here, the interaction and concentration of various risks play an important role. Since the interaction of risks may arise between financial and non-financial sectors, a perspective that recognizes aggregate risks is quite important, and it becomes crucial to determine which risk factor should be watched in evolving economic and financial conditions. 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.

In fact, looking at the land price problem from the viewpoint of the stability of the financial system, it was the potential 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. Shimizu and Shiratsuka (2000) employ an analytical framework of value at risk (VaR) to estimate the aggregate credit risk inherent in the loan portfolio of Japanese banks during the bubble period (‘stress testing’). This simple numerical exercise that incorporates sufficiently prudent scenarios for the probability of bankruptcy, the concentration of credit and the future fluctuation of collateral prices

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[31] In this case, it is not necessarily important to distinguish between the increase in the expected growth rate and the decrease in risk premium since both will have an impact on asset prices in the same direction. For example, if a rise in the yield spread of stocks reflects a decline in the risk premium, this suggests stronger confidence in the future, and corporate and household economic activity will become active as the expected growth rate increases. Hence, when considering the effects on asset prices, it suffices to evaluate the expected growth rate adjusted for risk premium.

shows that the magnitude of non-performing loans held by Japanese banks in the 1990s could have been predicted (see Figure 8 for the scenario for land price fluctuation, and Table 1 for the estimation results).

However, it should be noted that the analytical framework of Shimizu and Shiratsuka (2000) focuses on the changes in collateral values of bank loans, among various risk factors for bank loan portfolio. This approach is thus effective in the case of Japan in the late 1980s, whose financial system heavily depended on intermediated lending secured by real estate. Financial systems vary between countries in terms of the relative weights of intermediated lending and other features.

Of course, needless to say, it is obviously important to conduct numerical exercises in line with the aforementioned stress testing. In the case of the U.S. economy, for example, it might be more reasonable to employ a small econometric model that enables one to gauge the effects of capital gains and losses from asset price fluctuations on the economy to estimate potential risks in the economy. However, if the historical relationships among the various macroeconomic variables change, it is hard to forecast the future course of the economy accurately with conventional econometric models.

The above discussion suggests that no rules exist regarding how to recognize potential risks in the economy. In fact, Kindleberger (1995) points out that there are no cookbook rules for policy judgement, and it is inevitable that the monetary policy authority will have to make a discretional judgement.[32] It is important for a central bank to have a good track record and for it to achieve credibility regarding its preemptive policy actions before general agreement can be obtained. In this case, the good track record should include not only favorable financial and economic performance; such a performance must also be supported by decisive actions of the central bank with a high degree of transparency.

VI. Conclusions

This paper reviewed the implications of asset price fluctuations on the conduct of monetary policy, based on Japan's experience of the emergence, expansion, and bursting of asset price bubbles, with special emphasis on the linkage between asset price fluctuations and financial stability.

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[32] Kindleberger (1995) comments on this point as follows: "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."

Worldwide consensus has been established regarding the importance of central banks' independence and accountability in achieving price stability. However, concerning the role of central banks in prudential policy, a global standard has yet to be formed. The monetary policy of a central bank, which aims at price stability, is conducted using the financial markets and financial system as its transmission channel. The two objectives of central banks, i.e., price stability and financial stability, can be considered as complementary in the sense that achieving one is a precondition for achieving the other.

In order to connect the two objectives in a mutually complementary manner, I have focused on the implications of asset price fluctuations on the soundness of the financial and economic environment in the long run. It should be stressed that the importance of identifying whether asset price fluctuations properly reflect movements in their underlying determinants, or fundamentals, because of a misalignment of asset prices, or asset prices bubble, raises serious adverse effects on the financial system and on the economy when the bubble eventually bursts. Moreover, the effect of asset price fluctuations is asymmetric, with stronger effects in the case of an asset price decline. Monetary policy is required to respond to the potential risk of future asset price bubbles in a preemptive manner, based on an accurate analysis of the reasons behind the movement of asset prices.

It is important to note the following three points. First, the best thing monetary policy can do to foster sustainable economic growth is to deliver predictably stable prices. In this context, the central bank should aim at 'sustainable price stability' that supports medium to long-term sustainable growth, not 'measured price stability' designed to maintain a specific rate of inflation measured by a specific price index at a particular point in time. Even if measured inflation is stable, a central bank needs to alter interest rates promptly once it judges that the risk of damaging 'sustainable price stability' has increased.

Second, monetary policy also influences the financial system through the behavior of financial institutions and macroeconomic conditions. To achieve financial system stability, it is important to maintain not only a favorable macroeconomic environment but also the soundness of individual financial institutions. In this regard, the regulatory and supervisory authorities play an important role. Thus, it should be noted that, although financial stability is an important policy objective for the central bank, the central bank does not command the same power of influence over this objective as it does over price stability when trying to maintain a favorable environment. This clearly indicates the limited role of asset prices in the formulation of monetary policy.

Third, it might be the case that a conflict exists between the two objectives of

central banks, i.e., price stability and financial stability, in the short run. However, it is not appropriate to think that there is a fundamental trade-off between these two objectives, because the two objectives can be considered as complementary in the sense that achieving one is a precondition for achieving the other.

In this context, another important issue I have not mentioned explicitly so far is the relationship of the central bank to the financial supervisory authority. The objectives of the central bank with regard to achieving financial stability do not perfectly correspond to those of the financial supervisory authorities.[33] For example, Dewatripont and Tirole (1994), one of the leading textbooks on bank regulation, states that "[bank] regulation is motivated in particular by the need to protect the small depositors" (p. 31). In contrast, the main motivation for the central bank is not to protect depositors (especially small depositors) but to maintain the stability of the financial system as a whole.

It might be therefore the case that the central bank and the financial supervisory authority would have different judgments on the policy response to problems in the financial system, based on their own objectives. In this case, if the central bank were to make public its own judgment prior to that of the supervisory authority, it might cause some temporary friction in financial markets, for example by causing an intensification of concern about financial stability, thereby triggering a bank run. It is necessary for both the central banks and the financial supervisory authority to establish a complementary and cooperative relationship, based on a mutual understanding of the difference between their respective mandates. In this sense, it should be well recognized by the public that the two authorities do not always have the same views.

Of course, once a financial system falls into an unstable situation, it is also possible that this kind of central bank warning might arouse excessive fear in the financial markets. For example, BOJ Governor Hayami's warning in October 1998 that the capital ratios of 19 major Japanese banks were as low as the danger level was criticized severely as having been an 'inappropriate remark.'[34] In retrospect, however, it

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[33] Of course, as typically seen in countries in which a central bank is the only bank regulatory and supervisory authority, a central bank's commitment to designing the financial system and regulating and supervising financial institutions may vary, depending on the extent to which the central bank emphasizes this aspect.

[34] The *Nikkei* (morning newspaper on October 6, 1998) article quoted an article in the *New York Times* (daily newspaper on October 5, 1998), in which it was said that BOJ Governor Hayami participated in an unofficial meeting between Finance Minister Miyazawa and Treasury Secretary Rubin (FRB Chairman

can be seen that he was quite legitimately taking a risk in order to urge an early capital injection to ensure the revitalization of the financial intermediation system. In fact, he contributed to the decision to inject public money into the banks under the Financial Function Early Strengthening Law.

Panic in the financial system has a self-fulfilling nature. Even though warnings by the central bank are meant to accelerate the restoration of soundness in the financial system, there is always a considerable risk that such warnings may make it difficult to avoid systemic risk, once the message has been taken inappropriately. If this fear is materialized, the stakes are enormously high, especially if the safety net is not comprehensive enough to deal with imminent problems.

Central banks can contribute to sound economic development by achieving the two objectives simultaneously. To this end, the existence of a conflict between two objectives implies the necessity of coordination between the monetary and prudential policy functions in the central bank as well as between the central bank and the financial supervisory authorities. It might well be that there is a case of a serious conflict between price stability and financial stability in the short run. However, it is not appropriate to think that there is a fundamental trade-off between the two objectives, because two objectives can be considered as complementary in the sense that achieving one is a precondition for achieving the other. How the central bank should go about this issue is certainly an important open question.

Greenspan also took part in the meeting) prior to the G-7 official meeting held in Washington DC in early October 1998, and that Governor Hayami explained that "the capital ratios of 19 major Japanese banks were as low as the danger level." Since this article led to a widening of the Japan premium in the offshore market and temporarily made the Japanese banks' foreign currency funding difficult, Governor Hayami was criticized: for instance, the chairman of the Japanese Bankers' Association said, "The Governor made a imprudent comment, even though it is true." In response to this criticism, Governor Hayami answered in the Diet session of October 7, 1998, that it was a misleading quotation based on a misunderstanding. He also explained that his comment on the banks' capital accounts was misunderstood as a comment on their capital ratios. Later, in the Governor's regular press conference of October 15, 1998, he reflected on the bill of Financial Function Early Strengthening Law drafted by the Liberal Democratic Party, which provided capital injection scheme of public funds, and said, "None of the banks is sufficiently capitalized. Hence, I wish the banks altogether would give a positive response to the scheme and apply for the scheme given by the Government that appropriates public funds for strengthening the banks' capital accounts."

References

Alchian, Armen A., and Benjamin Klein, "On A Correct Measure of Inflation," *Journal of Money, Credit, and Banking* 5(1), 1973, pp. 173-191.

Amato, Jeffery D., and Thomas Laubach, "The Value of Interest Rate Smoothing: How the Private Sector Helps the Federal Reserve," *Economic Review*, Federal Reserve Bank of Kansas City, Third Quarter 1999, pp.47-64.

Bank of Japan, Institute for Monetary and Economic Studies, "Wakushopu 'Tei Infure ka deno Kin'yu Seisaku no Yakuwari'" (Workshop on 'Role of Monetary Policy under Low Inflation'), *Kin'yu Kenkyu*, 19 (2), Institute for Monetary and Economic Studies, Bank of Japan, 2000, pp. 1-29 (in Japanese).

Bank of Japan, Research and Statistics Department, "Bukka Shisuu wo Meguru Shomondai" (Issues regarding Price Indices), *Nippon Ginko Geppo*, Public Relations Department, Bank of Japan, August, 2000 (in Japanese).

Bernanke, Ben S., and Mark Gertler, "Inside the Black Box: The Credit Channel of Monetary Policy Transmission," *Journal of Economic Perspectives*, 9 (4), 1995, pp. 27-48.

_____, and _____, "Monetary Policy and Asset Price Volatility," in *New Challenges for Monetary Policy*, a symposium sponsored by the Federal Reserve Bank of Kansas City, 1999, pp. 77-128.

_____, _____, and Simon Gilchrist, "The Financial Accelerator and the Flight to Quality," *Review of Economics and Statistics*, 78 (1), 1996, pp. 1-15.

Blinder, Alan S., *Central Banking in Theory and Practice*, 1998, MIT Press.

Borio, C. E. V., N. Kennedy, and S. D. Prowse, "Exploring Aggregate Asset Price Fluctuations Across Countries: Measurement, Determinants and Monetary Policy Implications", *BIS Economic Papers*, No. 40, 1994.

Brainard, William, "Uncertainty and the Effectiveness of Policy," *American Economic Review*, 57 (2), 1967, pp. 411-425

Clarida, Richard, Jordi Galí, and Mark Gertler, "The Science of Monetary Policy: A New Keynesian Perspective," *Journal of Economic Literature*, 37 (4), 1999, pp. 1661-1707.

Crockett, Andrew, "Introduction," in BIS ed. *Asset Prices and Monetary Policy: Four Views*, Centre for Economic and Policy Research, 1998.

_____, "In Search of Anchors for Financial and Monetary Stability," speech given at SUERF Colloquium, Vienna, April 27-29, 2000.

Dewatripont, Mathias, and Jean Tirole, The Prudential Regulation of Banks, MIT Press, 1994.

Filardo, Andrew J., "Monetary Policy and Asset Prices," Federal Reserve Bank of

Kansas City, mimeo, 2000.

Goodfriend, Marvin, "Interest Rates and the Conduct of Monetary Policy," *Carnegie-Rochester Conference Series on Public Policy*, 34, 1991, pp. 7-30.

_____, "Financial Stability, Deflation, and Monetary Policy," IMES Discussion Paper, No. 2000-E-27, Institute for Monetary and Economic Studies, Bank of Japan, 2000.

Goodhart, Charles A. E., "Central Bankers and Uncertainty," *Proceedings of the British Academy*, 101, 1999, pp. 229-271.

Greenspan, Alan, "Opening Remarks," in *Achieving Price Stability: A Symposium Sponsored by the Federal Reserve Bank of Kansas City*, 1996.

Kamada, Koichiro, and Kazuto Masuda, "Production-function-based Output Gap in Japan: Effects of Measurement Error on the Estimation," mimeo, Research and Statistics Department, Bank of Japan, 2000.

Kent, Christopher, and Philip Lowe, "Asset-Price Bubbles and Monetary Policy," Research Discussion Paper, No. 9709, Reserve Bank of Australia, 1997.

Kimura, Takeshi, and Tomoki Tanemura, "Kin'yu Seisaku Ruru to Makuro Keizai no Anteisei" (Monetary Policy Rule and Macroeconomic Stability), Kin'yu Kenkyu, vol. 19, no. 2, Institute for Monetary and Economic Studies, Bank of Japan, 2000 (in Japanese).

Kindleberger, Charles P., "Asset Inflation and Monetary Policy," *BNL Quarterly Review* no. 192, 1995, pp. 17-37.

Kosai, Yutaka, Osamu Ito, and Ritsuko Arioka, "Bubble-ki no Kin'yu Seisaku to Sono Hansei" (Re-examination of Monetary Policy in Bubble Period), IMES Discussion Paper, No. 2000-J-27, Institute for Monetary and Economic Studies, Bank of Japan, 2000 (in Japanese).

Meyer, Laurence, "Structural Change and Monetary Policy," http://www.bog.frb.fed.us/boarddocs/speeches/2000/20000303.htm, 2000.

Mio, Hitoshi, and Masahiro Higo, "Underlying Inflation and the Distribution of Price Change: Evidence from the Japanese Trimmed-Mean CPI," *Monetary and Economic Studies*, 17 (1), Institute for Monetary and Economic Studies, Bank of Japan, 1999, pp. 103-132.

Mori, Naruki, Shigenori Shiratsuka, and Hiroo Taguchi, "Policy Responses to the Post-bubble Adjustments in Japan: A Tentative Review," IMES Discussion Paper, No. 2000-E-13, Institute for Monetary and Economic Studies, Bank of Japan, 2000.

Okina, Kunio, Masaaki Shirakawa, and Shigenori Shiratsuka, "Asset Price Bubble and Monetary Policy: Japan's Experience in the Late 1980s and the Lessons," IMES Discussion Paper, No. 2000-E-12, Institute for Monetary and Economic Studies,

Bank of Japan, 2000.

Orphanides, Athanasios, “The Quest for Prosperity without Inflation,” Working Paper, No. 15, European Central Bank, 2000.

_____, R. D. Porter, D. Reifschneider, R. Tetlow, and F. Finan, “Errors in the Measurement of the Output Gap and the Design of Monetary Policy,” Finance and Economics Discussion Series, Board of Governors of the Federal reserve System, August 1999.

_____, and David W. Wilcox, “The Opportunistic Approach to Disinflation,” FRB Finance and Economics Discussion Paper No. 96-24, 1996.

Saito, Makoto, and Shigenori Shiratsuka, “Financial Crises as the Failure of Arbitrage: Implications for Monetary Policy,” IMES Discussion Paper, No. 2000-E-28, Institute for Monetary and Economic Studies, Bank of Japan, 2000.

Shibuya, Hiroshi, “Dynamic Equilibrium Price Index: Asset Price and Inflation,” *Monetary and Economic Studies*, Institute for Monetary and Economic Studies, Bank of Japan, 10(1), 1992, pp. 95-109.

Shimizu, Tokiko, and Shigenori Shiratsuka, “The Credit Risk of Japanese Banks during the Bubble Period: A Pilot Study of Macro Stress Simulation,” IMES Discussion Paper, No. 2000-E-31, Institute for Monetary and Economic Studies, Bank of Japan, 2000.

Shiratsuka, Shigenori, “Inflation Measures for Monetary Policy: Measuring the Underlying Inflation Trend and Its Implication for Monetary Policy Implementation,” *Monetary and Economic Studies*, 15 (2), Institute for Monetary and Economic Studies, Bank of Japan, 1997, pp. 1-26.

_____, *Bukka no Keizai Bunseki* (*Economic Analysis on Inflation Measures*), University of Tokyo Press, 1998 (in Japanese).

_____, “Measurement Errors in the Japanese Consumer Price Index,” *Monetary and Economic Studies*, 17 (3), Institute for Monetary and Economic Studies, Bank of Japan, 1999a, pp. 69-102.

_____, “Asset Price Fluctuation and Price Indices,” *Monetary and Economic Studies*, 17 (3), Institute for Monetary and Economic Studies, Bank of Japan, 1999b, pp. 103-128.

_____, “Is There a Desirable Inflation Rate?: A Theoretical and Empirical Survey,” IMES Discussion Paper, No. 2000-E-32, Institute for Monetary and Economic Studies, Bank of Japan, 2000.

Stock, James H., “Monetary Policy in a Changing Economy: Indicators, Rules, and the Shift Toward Intangible Output,” IMES Discussion Paper, No. 99-E-13, Institute for Monetary and Economic Studies, Bank of Japan, 1998.

Taylor, John B., "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy*, 39, 1993, pp. 195-214.

Yamaguchi, Yutaka, "Asset Price and Monetary Policy: Japan's Experience," in *New Challenges for Monetary Policy*, a symposium sponsored by the Federal Reserve Bank of Kansas City, 1999, pp. 171-176.

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, concentra-tion 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

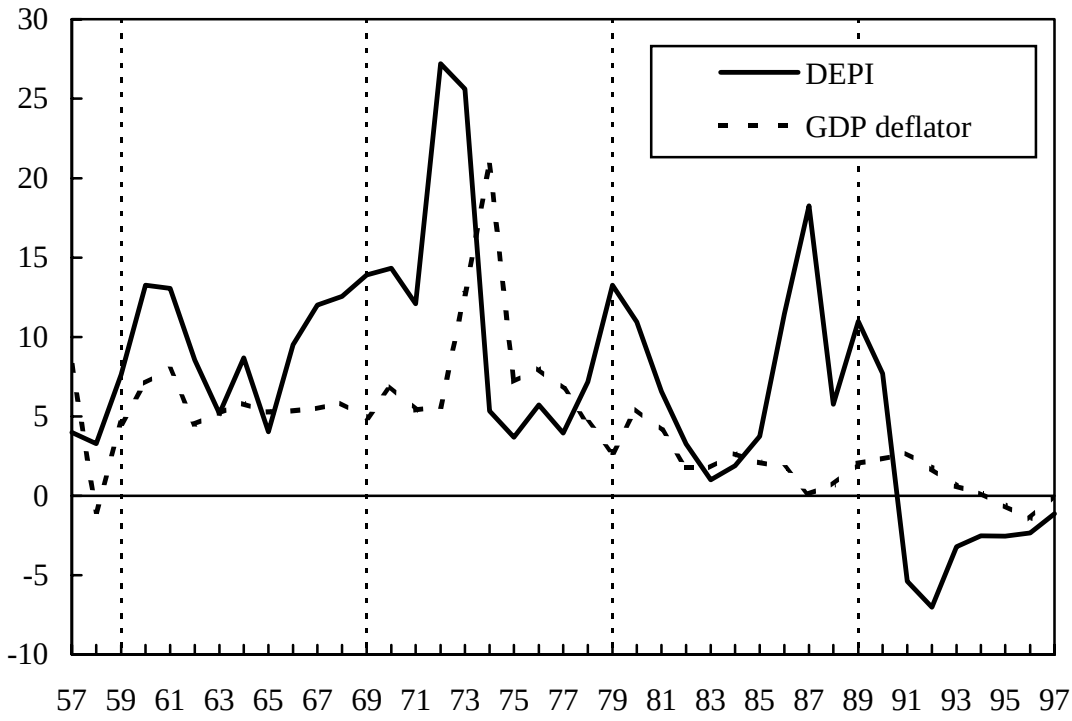
Source: Table 2 in Shimizu and Shiratsuka (2000).

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

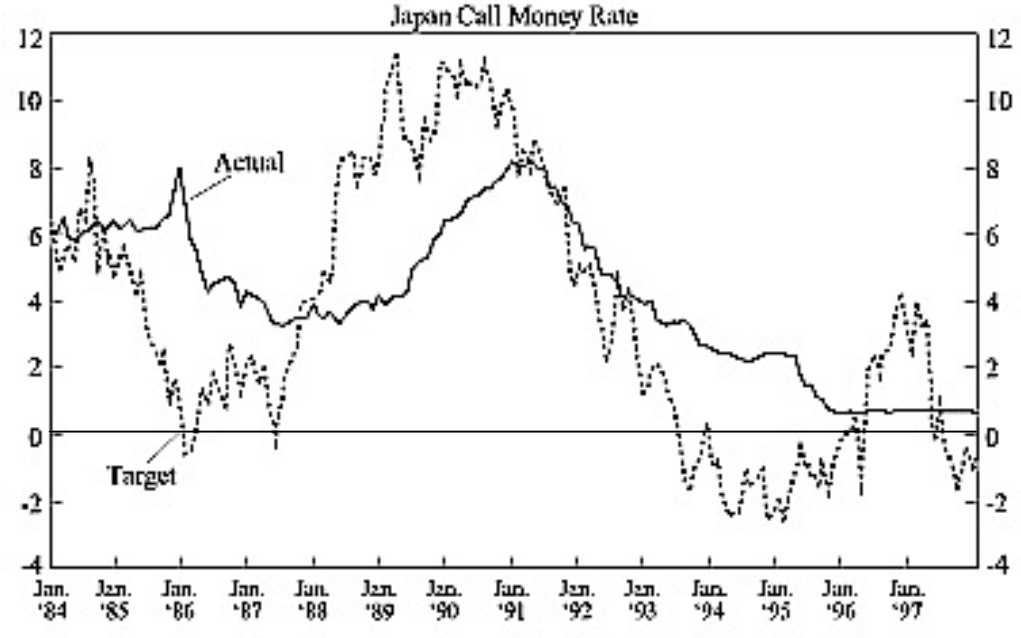
Figure 1: Movements of DEPI

(Changes from the previous year, %)



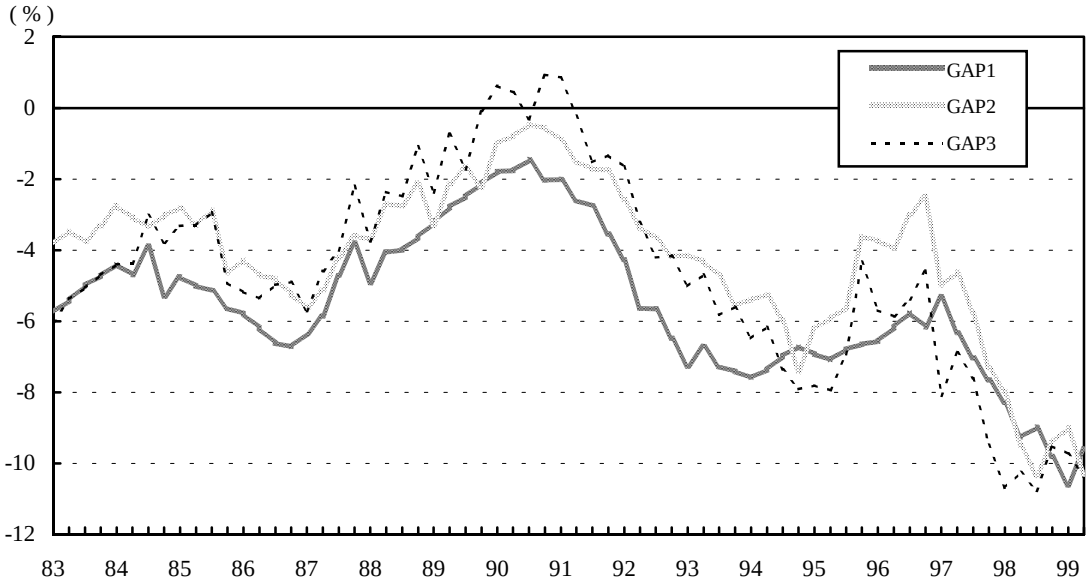
Source: Figure 1 in Shiratsuka (1999b).
Note: Weights for asset prices and GDP deflator are 0.97 and 0.03, respectively.

Figure 2: Simulation by Bernanke and Gertler



Source: Chart 10 in Bernanke and Gertler (1999).

Figure 3: Measurement Errors in the Estimates of GDP Gap



Sources: Kamada and Masuda (2000).

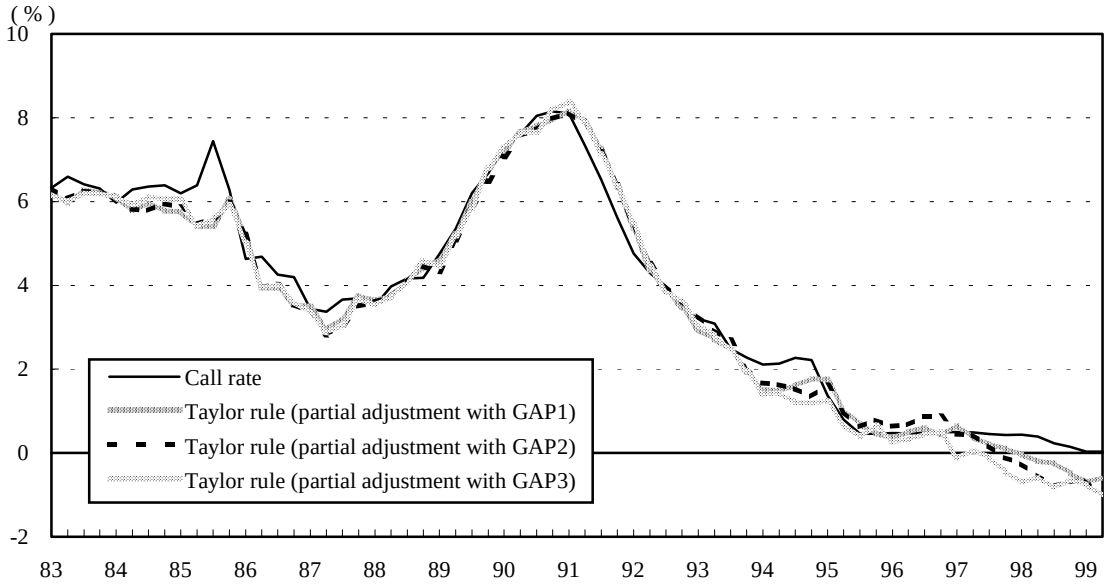
Notes: Gap 1 to 3 indicates as follows. For the details on the estimation procedure, see Kamada and Masuda (2000).

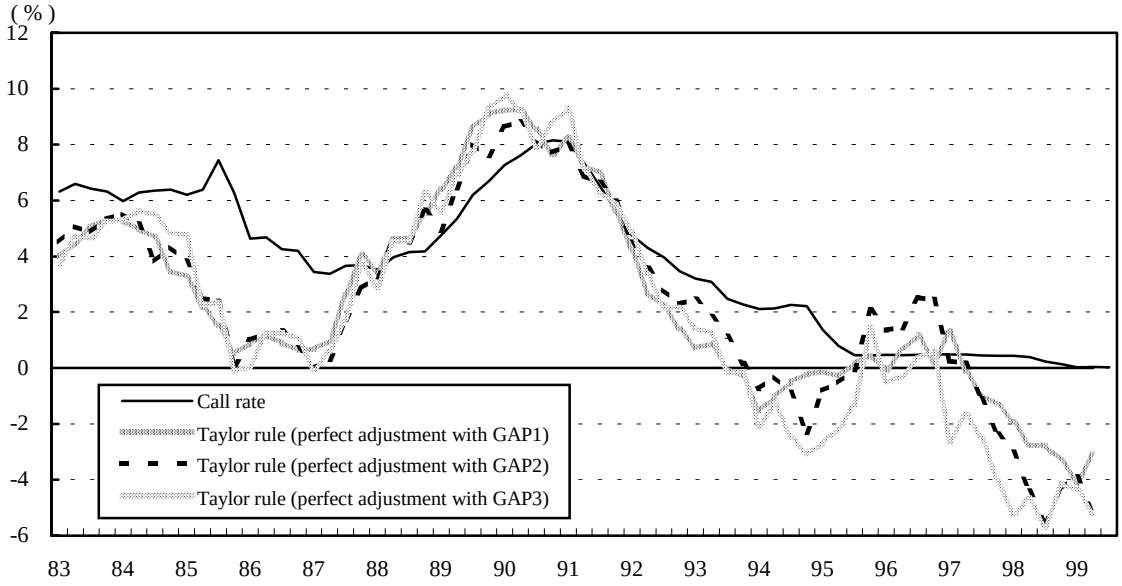
GAP1 --- Final GDP gap adjusted for the capacity utilization in non-manufacturing sectors.

GAP2 --- Final GDP gap fixing the capacity utilization in non-manufacturing sectors.

GAP3 --- Real time GDP gap applying the same estimation procedure employed in GAP2.

Figure 4: Estimates for Targeted Rates





Sources: Author's calculation based on the GDP gap in Figure 3

Notes: Baseline formula of Taylor's Rule: $i_t = (1-\rho)[\bar{i} + \beta(\pi_t^e - \pi^*) + \gamma(y_t - y_t^*)] + \rho i_{t-1}$

i_t: uncollatellized overnight call rates at *t*-period

$\bar{i}$: equilibrium rate of nominal short-term rate

π_t: CPI inflation rate at *t*-period

π_t^e: target inflation rate

y_t-y_t*: GDP gap at *t*-period

ρ: degree of interest rate smoothing (perfect adjustment ρ=0, partial adjustment ρ =0.85)

Figure 5: Non-linear Taylor Rule (Illustration)

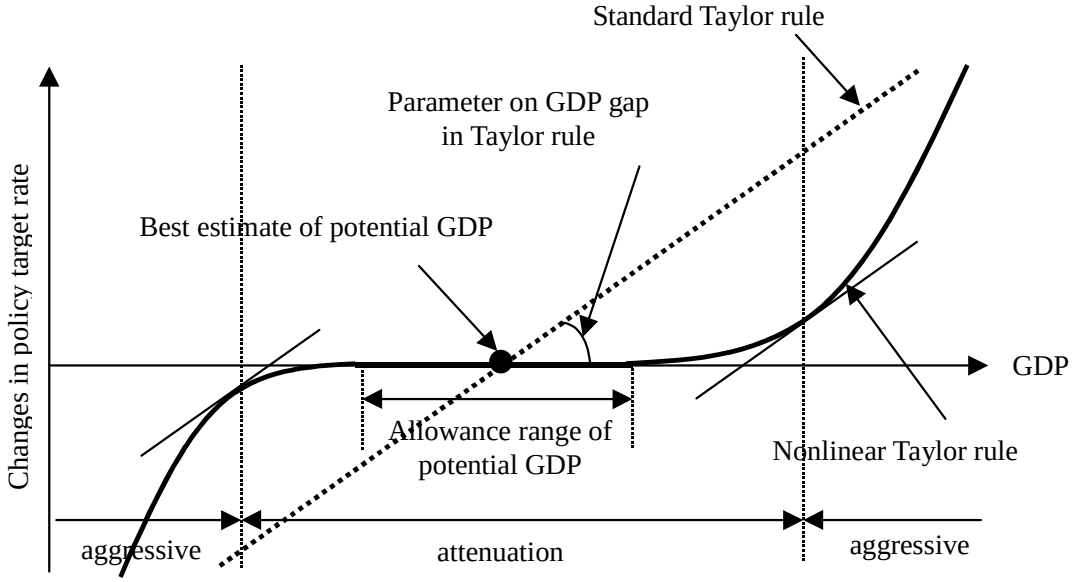
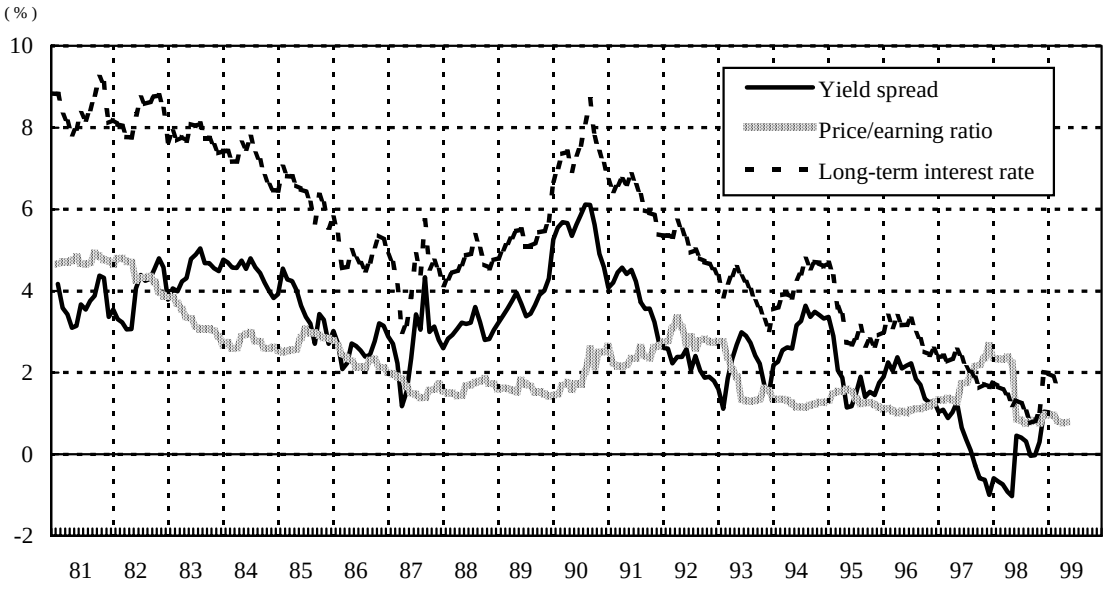
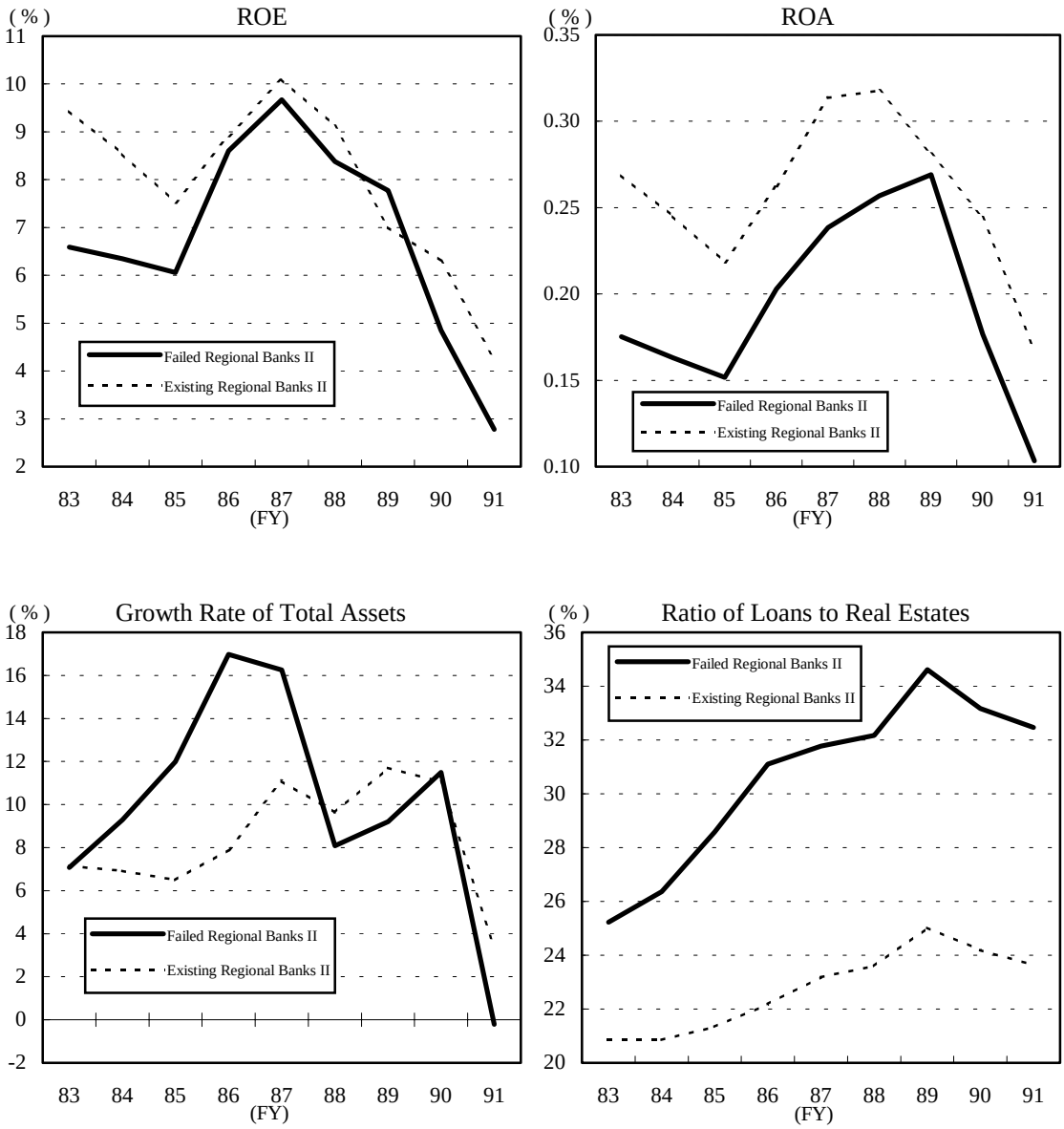


Figure 6: Equity Yield Spreads



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

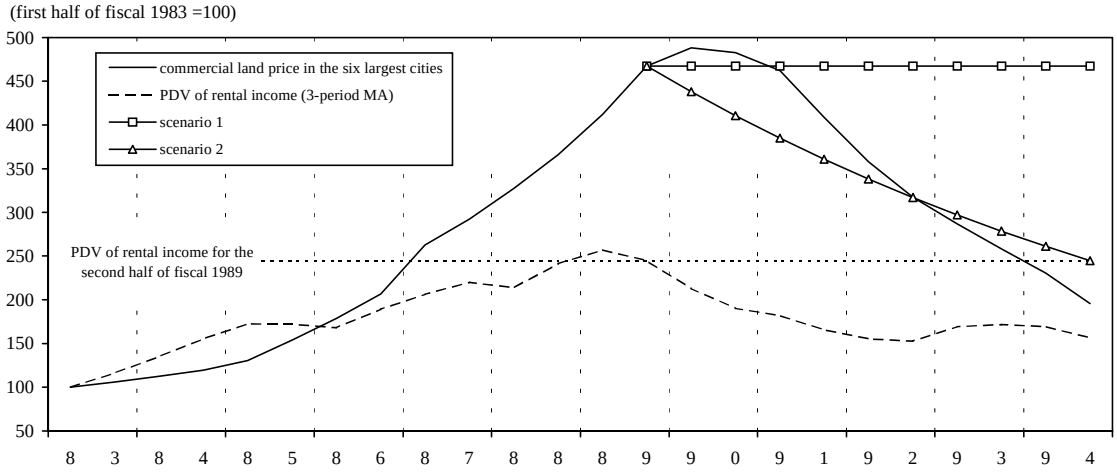
Figure 7: Profitability and Behavior of Failed Tier II Regional Bank



Notes: 1. Tier II regional banks are member banks of Second Association of Regional Banks.
2. Failed tier II regional banks are Taiheiyo, Tokyo Sowa, Kokumin, Niigata Chuo, Koufuku, Fukutoku, and Hyogo.

Sources: Figure 17 in Okina, Shirakawa, and Shiratsuka (2000). Originally taken from Japanese Bankers Association, *Financial Statements of All Banks*.

Figure 8: Scenarios for Land Price Fluctuations



Notes: 1. It is assumed for the 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).