

# Optimal Monetary Policy in an Environment of Low Inflation and Rising Asset Prices

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## Introduction

Asset prices rise and collapse, time to time. If general prices are rising with asset prices, a decision of the central bank is easy, that is, the monetary policy should be tightened to avoid overheating. However, if asset prices are rising sharply, while general prices stable and expected to remain stable, this poses a difficult question to the central bank. Should the central bank tighten monetary policy while general price are stable, just to stop asset price inflation? If so, on what grounds?

The role of monetary policy with regard to asset price inflation has been debated in the literature for at least a decade. Some academics and central bankers, including Bernanke and Gertler (1999, 2001) argue that stock prices per se are not an objective of the central bank. The central bank should monitor stock prices only to the extent that they would affect the future inflation rate. Higher stock prices or housing prices tend to push up consumption and investment through the wealth effect and higher collateral values. Therefore,

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increasing asset prices would predict higher general prices that the central bank target in the near future, given other macroeconomic conditions. The central bank decision should be based on forecast of inflation in the future, and asset prices influence the monetary policy decision only through the wealth effects. If Consumer Price Index (CPI) is stable, and expected to be stable, increasing asset prices should not trigger monetary tightening.

Some other academics and central bankers, including Cecchetti et al. (2000), think that asset prices should be watched with special interest, that is, beyond just a wealth effect channel. A sharp increase in asset prices may signal some risk ahead, in a way CPI forecasts would not be able to tell. It is prudent for the central bank to react to the asset price movements independent of current and expected CPI inflation rates. A most persuasive case would be an experience of financial fragility and output stagnation resulting from the bubble burst, such as Japan in the 1990s. It may be argued that the central bank should not allow a bubble to form in the first place, if the bubble would result in the bust later.

If asset prices are rising with general prices, then it is an easy decision – tighten the monetary policy. However, if asset prices are rising in the economy when the general prices inflation is low, the task of the monetary policy is difficult. Should the monetary policy react to the asset prices, even though the general prices inflation rate is low and stable? Should the monetary policy target the asset prices, even if it may cause a temporary recession with a view that a cost of boom and bust exceed a temporary recession?

Stock prices and housing prices do have strong interactions with other general prices, including CPI. An increase in asset prices stimulates consumption via wealth effects. An increase in asset prices also influence positively fixed investment via q-theory-like investment decision or via collateral-bank loan (credit) channel.

Therefore, it is quite natural to infer that asset price increases signals future aggregate output expansion and general price inflation. If current asset price inflation signals the future CPI inflation, then the inflation-targeting central bank should react to the asset price inflation although asset prices are not a part of objective function. This line of reasoning is probably widely shared by academics and central bankers as a reasonable framework of thinking.

Those who insist that asset prices have a special place in monetary policy decisions argue that asset prices have a different channel than just contributing to the CPI inflation rate in the future. All the risks that may come with asset price increases may not be adequately represented by the CPI inflation forecasts. There may be several risks associated with boom and bust: Risks in general of volatility in inflation rate and growth rate; risks to the financial institutions balance sheet if a bust results in an increase in nonperforming loans.

Even once agreed that asset prices are a particularly important variable that should be monitored independent of CPI forecasts, it is difficult for the central banker how to react to the asset price changes. First, asset price increases may reflect structural changes of the economy. The productivity increases, structural reforms, corporate restructuring, and capital inflows contribute to asset prices increases that may stay semi-permanent. Those positive supply shocks, that will keep general prices stable while output can be expanded, may raise the asset prices. The situation of low inflation and higher output may be called a "new economy." can be safely accommodated by the central bank. Many regard that the US economy in the second half of the 1990s corresponds to this category, and praise the Federal Reserves that did not tighten prematurely. Although Chairman Greenspan questioned the stock price behavior by a famous word, "irrational exuberance" as early as December 1996, monetary accommodation continued until the very end of 1990s.

Second, asset prices do respond to the low interest rate for the reasons that the present discounted value of future cash flows is higher if the interest rate is lower. Therefore the asset prices do fluctuate as the monetary policy attempts to counteract the boom and recession of the economy. The cyclical movement of the stock prices seems to be a natural part of business cycles, and the central bank should not respond to it.

Third, the most controversial example is the speculative bubble that drives the asset prices that are not even justified by theoretical pricing using future cash flows. If it is a phenomenon called a bubble or euphoria, then asset prices will come down sooner or later to the more theoretically justifiable level. Then the sharp decreases of asset prices would drive many individuals and corporations to (near) bankruptcies and banks will be beset with nonperforming loans. The description of a bubble and burst fit most to the experiences of the Japanese economies from mid-1980s to the beginning of 2000s. According to a conventional wisdom in Japan, the Japanese monetary policy erred to allow creation of an asset price bubble in the second half of the 1980s, and then help burst the bubble in the first half of the 1990s.

However, practicality of responses to the asset prices, if it is a bubble, can be questioned. Even if it may be desirable to prevent a bubble and burst, can the central bank credibly identify, in real time, a bubble as opposed to macro-fundamental changes toward high productivity growth (low inflation, high growth, and higher valuation of assets), say a "new economy"? What if the Chairman Greenspan tighten in December 1996, acting upon his own word, "irrational exuberance," then the new economy of 1997 to 1999 might not have been realized, and the US economy would have lost opportunities to grow without inflation.

Even if it may be desirable to lower the amplitude of asset prices and if the central bank can tell the bubble from the new economy, could the central bank have a

monetary policy tool to stop a bubble, while not hurting the economy in general? Under the usual circumstances, the central bank has only one monetary policy variable that is the interest rate. You cannot pursue two goals with only one variable.

Moreover, if the nonperforming loans, under-capitalization of banks, and financial systemic instability are the resulting risks from a bubble and burst, there is a limit that monetary policy can do. Once a strong bubble process takes place, the expected returns from stock prices and housing prices typically range in more than 10 percent. A few percentage point of interest rate increase would not dampen the expected return sufficiently. If the interest rate is raised to minimize the expected return, then the real economy might collapse and the CPI inflation rate may decline to a negative territory.

If financial fragility and the systemic stability is the reason that the bubble should be avoided, then financial supervision and regulation may be assigned to strengthen the financial system to the point that some volatility in asset prices can be endured without serious problem, rather than monetary policy is diverted to stability the asset prices. The Japanese burst of a bubble in the 1990s hit the economy particularly hard, because banks were undercapitalized in the first place and forbearance made problems much bigger before they were tackled to be addressed by the government.

Even in the last several years, the real world examples do require careful examinations. In the last several years, several countries, including some cities in the US, some parts of UK, Spain, and the Netherlands, have experience housing booms. Do they reflect some structural changes of the economy (such as Spain enjoying the low interest rate due to joining the euro and experience investment boom)? Or do they reflect a bubble fueled by speculative activities? It is difficult to answer these questions in real time.

The rest of this paper will be organized as follows. Section 2 is to review the experiences of Japan in the 1980s and the US in the 1990s. There are several parallels and differences, but both point to the difficulties in reacting to asset prices. Section 3 is devoted to a theoretical examination to conceptualize the central bank objectives and operations. Various ways to describe how the central bank should or should not respond to the asset prices will be defined and examined theoretically. Section 4 concludes.

## Historical Overview

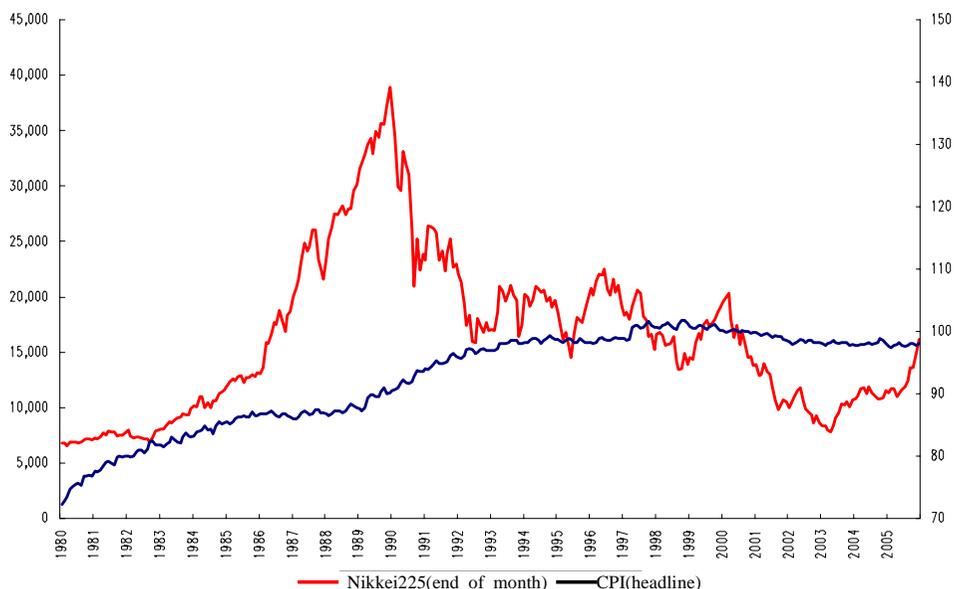
### 1. Japanese Bubble

It is often argued that the Bank of Japan made mistake in the second half of the 1980s to allow the bubble to form by keeping the interest rate too low for too long. Then the Bank of Japan let the bubble burst, or some even argue that the Bank of Japan actively pop the bubble. Once the burst bubble deepened and the interest rate became close to zero by 1995, monetary policy became powerless. Even though the economy went into low growth and deflation, the room for further easing was limited. The weight of nonperforming loans crushed some of major banks in 1997-98 and in 2003. Then, it appears that all the pains of the stagnation and deflation for 15 years originates from a mistake in letting the bubble start. Had the monetary policy been more vigilant toward the asset prices, could the 15-year stagnation and the banking crises avoided?

In retrospect, it is obvious that the Japanese economy experienced a typical bubble in asset prices. Figure 1 shows the levels of Nikkei 225 stock price index and CPI. The stock price index quadrupled from 1983 to 1989, and lost all of the gain in the following 12 years. The economic growth rate was approaching 5% toward the end of

1980s, surpassing the trend average of preceding years in the 1980s.<sup>1)</sup>

**Figure 1. Japanese Asset Bubble and Subsequent Deflation**



(File name: CPIStockPriceJapan.xls in "Bank of Korea")

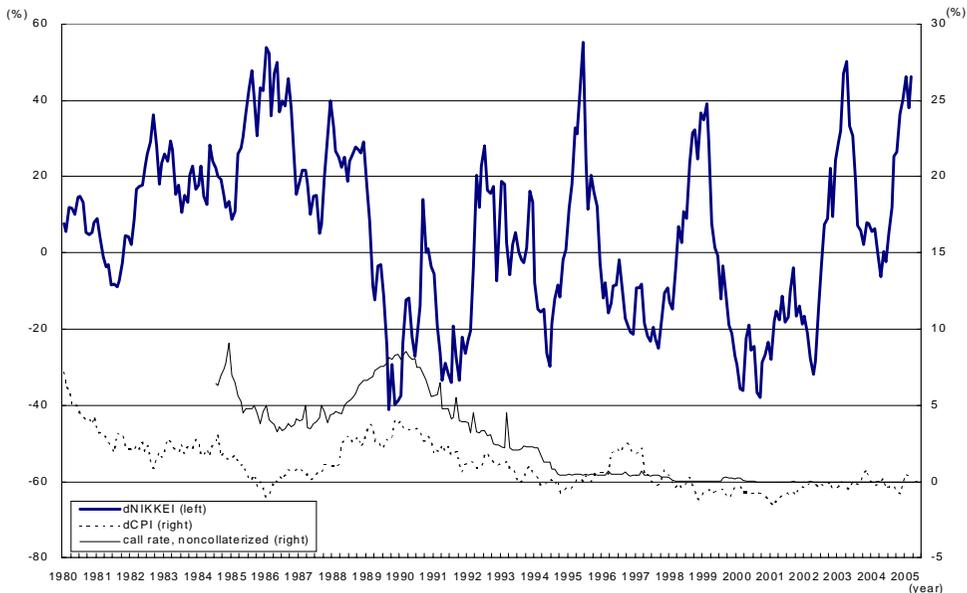
Toward the end of the bubble process, the official discount rate was kept at a (then) record low, 2.5%, from February 23, 1987 to May 31, 1989. During the 27 months, the Nikkei 225 Stock Price Index rose by 65%, from 20,800 to 34,300. The inflation rate fluctuated in the range of 0-3% in the second half of the 1980s. The inflation performance of Japan from 1976 to 1987, despite a lack of legal independence of the Bank of Japan, was often praised in the literature.<sup>2)</sup>

1) See Ito (1992) for a comprehensive explanation of the Japanese economy up to 1991 and Ito and Mishkin (2004) for monetary policy from 1990 to 2005.

2) See, for example, Cargill, Hutchison, and Ito (1997), for the view that the Bank of Japan have achieved *de facto* independence and exercised it wisely from mid-1970s to end-1980s.

As the May 31, 1989 increase in the official discount rate after the long period of low interest rate was 75 basis point, followed by two increases, each with 50 basic points, in October and December that year, monetary policy seemed to have been behind the curve. Figure 2 shows the changes in the Stock prices, CPI inflation rate and the overnight call rate.

**Figure 2.** Asset Price and CPI Inflation Rates and the Call Rate



(CPIStockPriceJapan3.xls)

The call rate remained below 5% until May 1989, but quickly raised by 200 basis point in the following 12 months. The call interest rate became above 8 percent and remained above 8 percent from September 1990 to June 1991, and then lowered very quickly to below 5% by April 1992.

The period from 1984 to 1989 was the one when the CPI inflation rate remained low and asset prices (both stock and land prices) were sharply increasing. Until the

very end of this process, many explanations were put forward to explain why asset prices were increasing while CPI remained stable, including liberalization and deregulation of several industries, and yen appreciation.

The yen appreciated sharply in 1985-86: from 260 yen/dollar in February 1985 to 150 yen/dollar in the summer of 1986. Some of the appreciation was a correction of too strong the US dollar, but the appreciation speed was clearly very rapid. Interest rates were lowered in 1986 and 1987 in part to help the export industries that were hit by the yen appreciation. Some blame international agreements, in the name of policy coordination, for monetary policy becoming behind the curve.<sup>3)</sup> The yen appreciation caused deflationary pressure on the CPI prices. A recession caused by the sharp appreciation lasted only six months in 1986, but imported prices continued to decline. Low interest rates were necessary to prevent the yen from appreciating too much.

Monetary policy switched to tightening in May 1989, when the official discount rate (ODR) rose from 2.5% to 3.25% in May 1989. The ODR rose to 3.75% in October and 4.25% in December. Despite this rapid hike of the interest rate, the CPI inflation rate rose from 1% at the beginning of 1989 to 3% toward the end of the same year, partly due to the introduction of the VAT in April 1989. The CPI inflation rate remained high during 1990 and 1991, even the asset prices were sharply declining. The official discount rate was raised to 6.00% in August 1990 (a 350 basis point hike in 15 months), while the stock prices have lost about 40% of the peak value in eight

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3) Okina, Shirakawa, and Shiratsuka (2001) seem to blame international policy coordination, such as the Plaza Accord of September 1985 and the Louvre Accord of February 1987 for the Bank of Japan not acting in a timely manner. Tightening for controlling inflation was delayed due to international commitment. However, the Plaza accord was to appreciate the yen, among others, by raising the Japanese interest rate, and the Louvre Accord was to stabilize the level of the yen, neutral for monetary policy. Resistance for the yen appreciation was home-grown rather than international commitments. See also Okina and Shiratsuka (2002).

months. The Bank of Japan was fighting inflation when the bubble was collapsing.

The Nikkei 225 index peaked at the level of 38,915 at the last business day of 1989. While the interest rate was rising, regulatory tightening was applied to the land market transaction in March 1990, including limiting the increase in bank lending to real estate-related sectors, and raising taxes on realized capital gains from land investment. The stock price index declined by one-third from the end of 1989, the peak, to the end of 1990. Stock prices continued to decline and another heavy losses occurred in 1992. The Nikkei index lost 60% of the peak level by the summer of 1992.

## **2. Should the Bank of Japan nipped the bud of bubble?**

Some argue that monetary policy was too loose in the second half of the 1980s for too long. Although the dampening effects of yen appreciation in 1985-86 was a concern for recession (and lower inflation rate), the economy was fully recovered by 1987. It would not have been recommended to tighten the monetary policy in 1985-87. Some Taylor-type models, including Bernanke and Gertler (1999), suggest that the monetary policy should have been loosed further from 1985 to 1987. They suggest more tightening in 1988. When the CPI inflation rate is about 0.5% while the stock and land prices are increasing at 30% annually, what should monetary policy have done? What if monetary policy was tightened in 1988?

An early tightening, say in the summer of 1988, would have prevented the inflation rate from moving up above 3% in 1990-91. However, it probably would not have had a measurable impact on the stock and land bubbles in the last year of the process. The actual Nikkei index was above 30,000 in December 1988 and reached near 39,000 in December 1989. How much of this process would have been shaved is a good question. Even if the interest rate had been hiked in 1998, it is unlikely that the

expected return of purchasing an asset would not have been affected very much when the asset is in a bubble process.<sup>4)</sup>

The Taylor rule proposed by Bernanke and Gertler (1989) suggest that the interest rate should have been at around 10% in mid-year 1989. Okina and Shiratsuka (2002) criticized Bernanke and Gertler (1999) on the grounds that the influence of the VAT increase in April 1989 is not dealt with properly. The Bernanke and Gertler (1999) used a forward-looking inflation rate as expected inflation, but the inflation rate they used was not adjusted for the VAT (consumption tax) introduction. Okina and Shiratsuka argued that Bernanke and Gertler's result for the rapid increase of interest rate, up to 10% in 1989, is due to the introduction of the consumption tax in April 1989. The paper by Okina, Shirakawa, and Shiratsuka (2001) contains a good review of why the bubble happened, how the BOJ reacted, and what could have been done, from the angle of the central bank.<sup>5)</sup>

Assessment of monetary policy in Japan in 1987 and 1986 is difficult. Could one justify the monetary policy that lowered the discount rate to 2.5% in February 1987 and maintained it at 2.5%, then the record low, until May 1989? One may argue that the Bank of Japan should have applied tight monetary policy in 1987 in order to curb asset price inflation. But, it would have been difficult to justify the action given the low CPI inflation rate, the slow economic recovery from the yen-appreciation recession of 1986, and the aftermath of Black Monday in October 1987. We are not confident that preventing asset price inflation was an overriding priority of the central bank in 1987. On the other hand, the tradeoff had disappeared in 1988 when both CPI price forecasts and asset price movements now indicated that at least modest tightening would have

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4) See Ito and Iwaisako (1996) argued that the Japanese bubble in the 1980s was an application of stochastic bubbles.

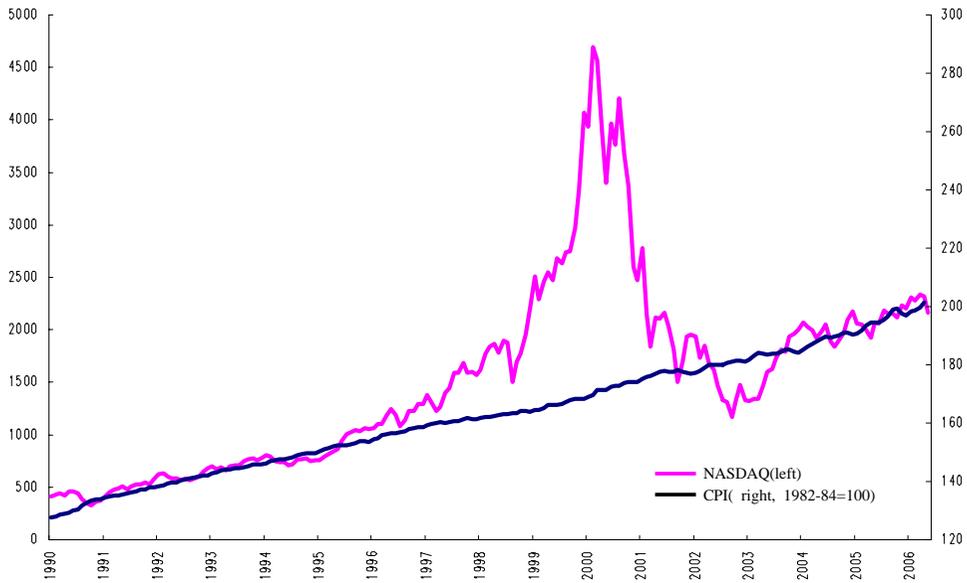
5) Okina, Shirakawa, and Shiratsuka (2001; section IV) argue that that the BOJ lowered the interest rate from 1986 to 1987 to support the "policy coordination" framework, and to prevent the appreciation of the yen.

been justifiable. The BOJ was probably behind the curve in 1988.

### 3. United States

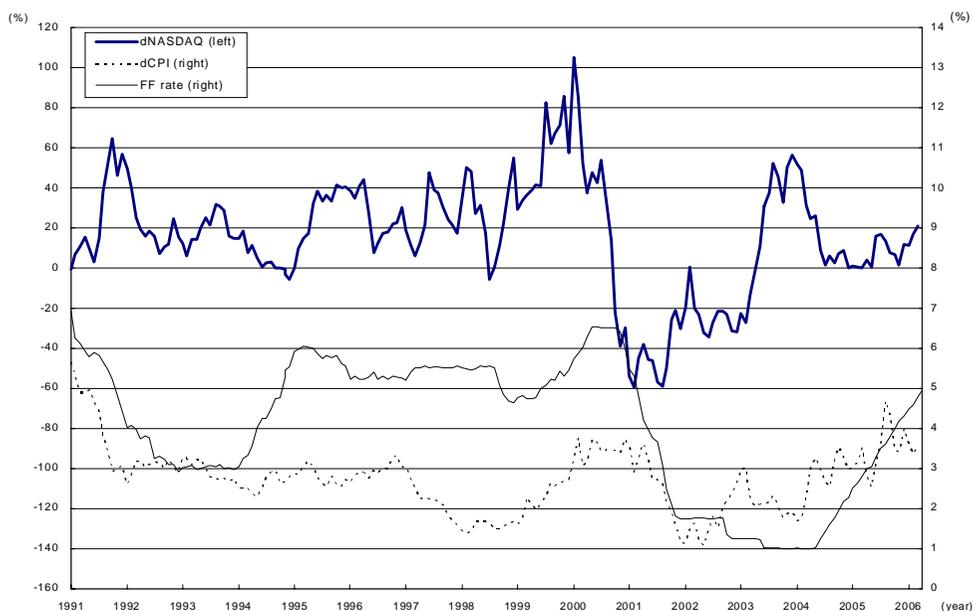
When Chairman Greenspan warned of the irrational exuberance in December 1986, DOW was about 6,500. No measurable tightening was applied, and the DOW went on to exceed 11,000 by December 1999. See Figure 3. The relative calm of the CPI and high and steady increases in NASDAQ, along with the interest rate is shown in Figure 4.

Figure 3. US IT Bubble



(Kabu.xls)

Figure 4.



Few criticize the FRB decision not to tighten until 1999. Many think that had Chairman Greenspan acted to tighten in the mid-1990s, the "new economy" may not be materialized. What are the differences in the evaluation of the Bank of Japan in the 1980s and the FRB in the 1990s? In the case of the United States most of the asset price increases, except the tech stocks, were more or less propelled by fundamentals, while in Japan they turned out to be mostly bubbles. In the case of the United States, the burst of the bubble in 2000-2001 did not cause any financial fragility, while in Japan financial fragility and banking crisis was major losses. The contrast of the two episodes provide great insights in answering the fundamental questions about the desirability of central bank responding to the asset prices.

## Asset Prices and Monetary Policy: Synthesis and Conclusion

In general, the first central question is when the asset prices are rising sharply, should the central bank attempt to prevent the bubble? The situation is like the Bank of Japan in the second half of the 1980s and the Federal Reserve in the second half of the 1990s. As explained above, Bernanke and Gertler (1999) examined monetary policy in the presence of asset price bubbles, with some application to Japan. They built a model with an exogenous process of an asset price bubble, and then apply alternative monetary policy rules, one traditional and another with stock returns. Then, they applied the Clarida, Gali, and Gertler (1998) modeling to estimate reaction functions for the Federal Reserve and the Bank of Japan. The forward-looking model assumes rational expectation for estimating expected inflation rate that is used to calculate the inflation rate gap. (See an earlier criticism by Okina, Shirakawa, and Shiratsuka (2001) on this point with regard to the introduction of consumption tax.) Their results indicate that the Japanese policy was too tight from 1985 to 1988 and too lax from 1988 to 1990, fueling a stock bubble, and too tight, again, from 1992 until at least 1996. They argue that *even without explicitly targeting* the asset prices, the Bank of Japan should have tightened from 1998 to 1990, probably ending the bubble, much earlier. Bernanke and Gertler (1999) with simulation results came down to the side that explicit targeting of the asset prices are not necessary.

Some researchers, more than others, think that asset prices should be considered as a part of price stability that should be broadly defined. Cecchetti, et al (2000) argued strongly to put asset prices as direct measure of the goal of monetary policy. The welfare losses from having a bubble are higher volatility in output and inflation. If monetary policy can help lower the probability of an initiation or continuation of a bubble, then the short run cost of higher interest rate may be more than offset by

avoiding long-run losses. First, they examined the Kent and Lowe (1997) model in which the probability of bubble bursting depends on monetary policy. In the three-period model, lowering the possibility of continuing a bubble into the third model, by forcing the bubble to collapse in the second period, then the cost of deflation in the second period may be smaller than the larger loss in the third period of burst bubble. Second, Cecchetti, et al. (2000) critically examined Bernanke and Gertler (1999) that assumes the exogenous bubble process, and showed that, by altering the specification of the policy rule and a loss function, the conclusion could be reversed the central bank should react directly to the asset prices. Cecchetti, et al. (2000) go on to argue that by augmenting the inflation targeting framework with asset prices, the central bank could respond various kinds of risks and uncertainties better than otherwise. Bernanke and Gertler (2001) argued that criticism by Cecchetti, et al. (2000) may not be general. Gruen, Plumb and Stone (2003) also examined a similar model, and concluded that the desirability of having asset prices all depend on several key assumption. They concluded that the case for responding to asset prices is strengthened if the probability of the bubble bursting of its own accord is lower, and the efficiency losses associated with big bubbles are larger, and the assumed impact of monetary policy on the bubble process is higher.

The difficulty in using monetary policy (raising and lowering of the interest rate) alone to prevent a bubble can be summarized as follows. First, the central bank often would not know whether asset prices are rising due to fundamentals or due to a bubble. Second, when the bubble is in force, it would take very high interest rate to pop the bubble, and that would throw real variables into volatile fluctuations. Those skeptics emphasize the importance of supervision policy rather than monetary policy to maintain financial stability. There is a fundamental law in (linear model) economics that there should be at least two policy instruments to pursue two policy objectives. No perfect solution for the interest rate policy can be obtained to pursue both CPI price stability and asset price stability.

In sum, after examining the above arguments, we come to a conclusion that how much the central banks should react to the sharp asset price increase depends on several factors. In general, the central bank should NOT respond to the asset prices if the following statements are more true than false:

- (1) The central bank is less certain whether asset price increases are due to an asset price bubble as opposed to favorable supply shocks;
- (2) The monetary policy (interest rate) influence on the bubble bursting probability is less certain and weak;
- (3) Lower welfare losses from volatility of inflation and output due to a boom and bust;
- (4) Lower welfare losses from volatility of asset prices themselves, in particular financial institutions balance sheets are robust against fluctuations of the asset prices;
- (5) Regulatory measures, such as regulating the loan/value ratio, the short-term capital gains tax hike, can be employed with minimum distortions.

Therefore, Mishkin (2001), Mishkin and White (2003), and Ito (2003) are rather skeptical to a view that the central bank should react to the asset price increases. Ito (2003) emphasized the role of bank supervision, rather than monetary policy, for preventing a bubble or managing a burst bubble on the belief that the most damaging part of the Japanese bubble and burst was that it caused a banking crisis, which could have been avoided by tougher regulation a la Basle capital-adequacy ratio and early interventions to the financial fragility.

Posen (2003) argues that the link between the lax monetary policy and asset price increases is not certain, based on the cross-country data. He thinks that extremely lax monetary policy in the second half of the 1980s in Japan played only a small role in contributing to the bubble. According to him, it is not necessarily true that the burst of asset price booms results in a prolonged recession and deflation of the general prices.

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